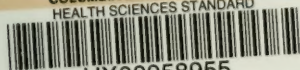


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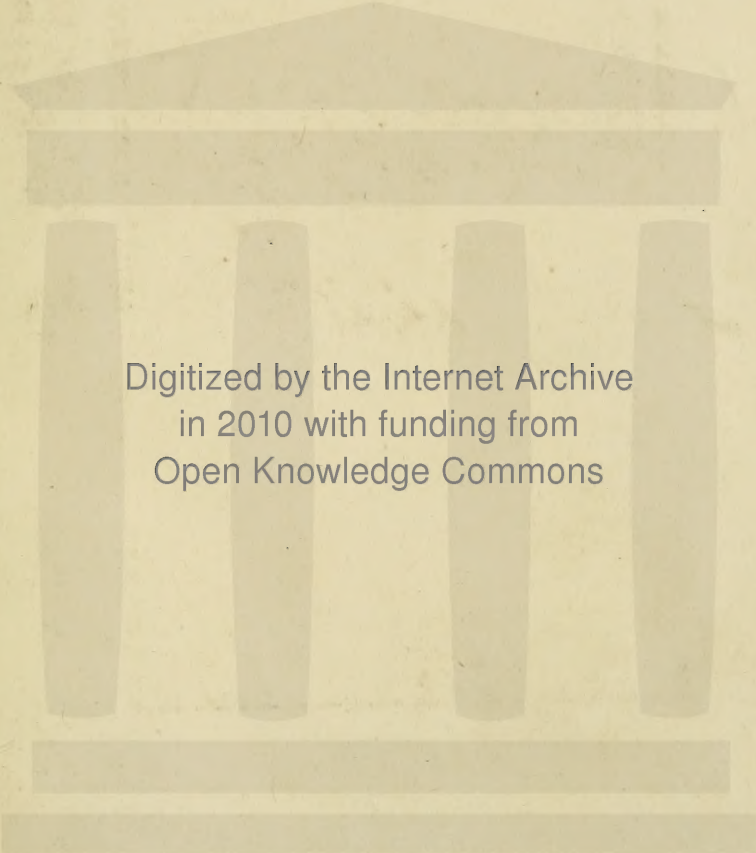
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INDISPENSABLE ORTHOPÆDICS

INDISPENSABLE ORTHOPAEDICS

A HANDBOOK FOR PRACTITIONERS

BY
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ORTHOPÉDIQUE DE BERCK, ETC.

TRANSLATED FROM THE SIXTH FRENCH EDITION

BY
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ILLUSTRATED

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PREFACE TO THE 6th EDITION

In less than 4 years this book has reached the 6th edition and has been translated into 5 languages.

Is it not a proof that it has already helped French and foreign practitioners and that it may still further help them?

We have done our best to make it do so. This 6th edition, carefully revised, has been **enlarged by 100 pages** and **100 figures** on **external tuberculosis, fistulæ, the preparation¹ of the liquids and pastes to be injected, fractures of the neck of the femur, coxa vara**, etc. Besides, over one **hundred** of the original illustrations have been **replaced** by as many new ones, clearer and more explanatory. All our care has also been brought to bear on the material execution of this work which — thanks to the combined efforts of our publisher, our printer, and our very able illustrator D^r Fouchou-Lapeyrade — has been brought up, we think, to the highest possible degree of perfection that can be attained at the present time.

We hope that being so much improved, this 6th edition will deserve, more even than the preceding ones, the favourable reception given to our book by practitioners all over the world.

PREFACE TO THE 5th EDITION

This 5th edition contains nearly 300 pages and 300 figures more than the 4th, without counting 8 photos in colour.

The principal additions bear on the technique of the apparatus and punctures, which we have been careful to explain in a clear and detailed manner — not afraid of being too long or of dwelling on too small details. For, having seen at work, during our holiday courses, several hundreds of doctors and students, we are convinced that the double technique (of apparatus and punctures) which was thought to be generally known, is very badly understood and still worse applied — with a few rare exceptions.

And for any one who does not begin by learning thoroughly the methods of making the plaster and of practising injection it is utterly impossible to treat successfully any of the diseases described in this book.

1. According to the method of our assistant D^r Fouchet, of Berck.

PREFACE TO THE 4th EDITION

The 3th edition of this work has received from the medical public the same measure of success as the first two.

So kind a reception is, for the author, not only a highly valued reward but also a definite encouragement to persevere in the method he has chosen in explaining the orthopedic techniques which are the subject of this book.

PREFACE TO THE 3th EDITION

Let us point out among the additions, the chapter on **the prognosis and treatment of external tuberculosis in general**, and on **the mentality which all doctors entrusted with these treatments ought to have**.

The object pursued now and always by the author, in his alterations and additions as in his first work, is to provide for his colleagues a **guide sure and easy to follow** and necessary to enable them to institute and successfully complete the treatment of external tuberculosis and of orthopædic affections.

PREFACE TO THE 2nd EDITION

This 2nd edition, following so rapidly on the former, cannot show any noticeable changes.

Nevertheless every page of the text has been carefully revised and a few even entirely altered, so as to render even clearer the explanations of certain especially delicate techniques.

The illustrations have been enriched by 30 new ones, while about 30 of the old have been replaced by others more explanatory.

This shows that the author has neglected nothing to render the book still more worthy of the favourable reception it received from the whole medical press and from practitioners.

PREFACE TO THE FIRST EDITION

Nearly every day practitioners are consulted for hip disease, Pott's disease, white swelling, congenital luxation of the hip, scoliosis, rickety manifestations, in a word, for a **deviation, congenital or acquired.**

But they know too little about the treatment to dare to institute it or to be able to apply it successfully.

How is it that doctors who so often treat fractures and traumatic luxations do not dare, or are unable to treat orthopedic affections which are not, as a rule, more difficult to correct and to maintain?

It is because they have not learnt to do it.

True, fifteen or twenty years ago, or even only ten years ago, there was no possibility of learning it, for the treatment of most of these affections was then too uncertain, too complex or even absolutely non-existent.

Congenital luxation of the hip, for instance, was still the one incurable disease, the disgrace of surgery. Hip or Pott's diseases with suppuration ended in death. These three diseases, hopeless yesterday, we can now cure with certainty. And for all deviations the treatment has been so much improved that we can affirm without much exaggeration that **these affections, most difficult to treat barely 12 or 15 years ago, yield to day the most certain and lasting cures.**

Not only can we cure them, but **we know how to cure them by simple, harmless and easily applied methods.** Their treatment no longer implies great surgical operations nor expensive or complicated mechanical means.

In cases of hip or Pott's disease with suppuration, punctures only are required, which punctures are certainly easier to perform than those frequently used in treating pleurisy.

In cases of congenital luxations and other deviations, the correction is obtained by simple orthopædic manipulations and is maintained up to complete cure by the aid of a well made « plaster ». Is it not the way we already act in cases of fractures or traumatic luxations?

Thus the **treatment of orthopædic affections has become accessible to all practitioners.** A beneficent revolution which carries with it the most practical results; for $\frac{3}{4}$ of the patients, unable to visit the specialists of the large centres, remained until now wholly untended.

But let there be no misunderstanding. When I say you can treat and cure these diseases, **this is absolutely true only during the first period.** Later on what you can do is limited and, in many cases, you are powerless.

I should never advise you to interfere with a congenital luxation 15 years old, or with hip disease or a gibbosity several years old. The treatment is then very difficult, indeed almost hopeless, and must always be the work of a specialist.

No. **What I require from practitioners is to begin treating these diseases from their commencement,** because at this period the evil is easy to cure.

In fact, is it not you, the family doctor, who sees his patients at the onset? Learn then how to utilise this priceless advantage; learn how to take advantage of this period in which the cure is relatively easy, which lasts not merely for a few days, but several months, and even, in the case of certain of these affections, for several years.

But, above all, do not take advantage of their long duration to temporize. Why should you wait? When you are in the presence of a traumatic luxation or of a fracture do you not act at once?

If only the practitioners who see these diseases at their onset would do their duty!

But how are they to know what this duty is?...

To give you that knowledge is the purpose of this book.

We have endeavoured to be clear and concise without however omitting any necessary or useful details. On every page figures illustrate the various periods of the treatment in such a way that any one of you will be able to use any of the approved methods, any where, even without a special installation or a trained assistant.

I hope that, thanks to this guide, all doctors so desirous will henceforth dare to institute and successfully complete the treatment of orthopædic affections.

If it is so, the time and the work spent on this book will not have been wasted ¹.

1. I wish to thank here my assistant for the last eight years Dr Fouchou-Lapeyrade, whose talent for drawing and deep knowledge of the subject enables me to illustrate it so cleverly.

DIVISIONS AND PLAN OF THE BOOK

THREE PRELIMINARY CHAPTERS : *A. Technique of the apparatus.* — *B. Anaesthesia.* — *C. Technique of punctures and injections in external tuberculosis.*

PART I : **Acquired orthopædic affections, of tuberculous origin.** — Pott's disease. — Hip disease. — White swelling.

PART II : **Acquired orthopædic affections, non tuberculous.** — Scoliosis, round back, lordosis. — Rickety deviations. — Genu valgum. — Tarsalgia. — Infantile paralysis.

PART III : **Congenital orthopædic affections.** — Congenital luxation of the hip. — Club foot. — Torticollis. — Little's disease.

PART IV OR **appendix** : **Cervical adenitis.** — **Other external tuberculoses** (cold abscesses, osteitis, synovitis, spina ventosa. Tuberculosis of the testicle). — **Multiple tuberculosis.** — **Syphilis** of the skeleton. — **Osteomyelitis.** — Diagnosis of osteitis or of chronic arthritis.

ADDITIONAL NOTES : 1° On **tuberculoses** : *a)* Is it advisable to operate upon them? *b)* how to prepare the liquids and pastes to be injected. *c)* treatment of fistulae.

2° On the treatment of **fractures** : *a)* of the patella. *b)* of the **olecranon.** *c)* of the neck of the femur.

3° On **coxa vara** and its treatment.

THE HEXALOGUE

OR THE SIX COMMANDMENTS OF ORTHOPOEDICS

1. *Early diagnosis.*
2. *Immediate treatment.*
3. *Perseverance in treatment.*
4. The preparation of *well-fitting* plasters.
5. In the correction of *tuberculous deformities, to reduce traumatism* to a minimum.
6. To guard against operating upon the *tuberculoses; never to open* cold abscesses but to puncture and inject them.

I

Early diagnosis. — Whenever a child is presented to you with a loss of power or a pain seated in any part of the skeleton, you should never neglect to **inspect and examine the child completely nude** (palpate, apply pressure, ascertain the extent of the movements).

II

Immediate treatment. — The diagnosis being made, do not temporize; commence the treatment without delay, for the malady does not wait.

Immediate treatment is synonymous (nearly always) with **easy treatment and perfect cure.**

III

Perseverance in treatment. — Continue the treatment without intermission to the end; the end may be protracted, it may be **one or even several years.** Warn the parents of this and impress upon them that, just as in your own case, a strong dose of patience is necessary for them.

IV

To make plasters which fit well. — You should know how to adapt a plaster which will give a good support without being uncomfortable. This is as indispensable a matter in orthopædics as asepsis is in surgery. **It is as easy to make a good plaster as it is a bad one**, just as it is as easy for the practitioner to be aseptic as septic.

V

Avoid every useless traumatism. — In the correction of tuberculous deformities, one should proceed gently and rather by set stages. It is more necessary here than in other deformities, in order to **prevent all danger of generalized tuberculosis.**

VI

To guard against operating on the tuberculoses. — ***Never open a focus nor leave it to open.*** — If the tuberculous focus has suppurated, — if an abscess has formed, a gland has broken down, an osteo-arthritis suppurated — **puncture and inject.**

If the focus has not suppurated, and is easily accessible (this is true for all external tuberculoses except Pott's disease), make, in the focus of these torpid lesions, *modifying injections*, to produce or to hasten the hardening or softening, after which you puncture as in the first case.

Remember that, in **tuberculosis**, **operation rarely cures**, it **often aggravates** and **always mutilates**; whilst **punctures and injections are a sure treatment**, harmless and practical.

THREE PRELIMINARY CHAPTERS ON GENERAL TECHNIQUE

1° In **orthopædics**¹, those will have the **best results** who know how to make the **best apparatus**.

2° In the **external tuberculoses**, those will have the **best results** who know **best how to make punctures** and **injections**.

Whence the necessity of commencing by a careful study of the two techniques : of apparatus and of punctures.

And as a large number of deformities cannot be corrected without chloroform, we shall study in the third preliminary chapter, this very briefly, the practice of **anaesthetics**.

CHAPTER FIRST

THE APPARATUS

Every doctor should know how to make a plaster apparatus. It is as necessary — and even more often necessary — than to know how to arrest a hemorrhage.

Without an apparatus it is impossible to treat a fracture, an arthritis, certain luxations or certain grave traumatisms, etc., etc.

This applies to all general practitioners.

But what shall we say as to apparatus, for those specially interested in orthopedics? Without apparatus one can do nothing, or next to nothing. Without apparatus one can neither prevent nor arrest nor correct a deformity.

You can judge of the skill of the orthopedic surgeon by the

1. And one may add : in *fractures* and most *affections of the skeleton*.

apparatus he makes use of. “ Show me your apparatus and I will tell you what you are. ”

I

THE PLASTER APPARATUS

Plaster apparatus are the **best**, and one may add that plaster **suffices for everything** and nothing can replace it.



Fig. 1. — Type of a plaster apparatus : this is the apparatus one applies for tibio-tarsal arthritis, and for fractures of the leg.

Plaster is an object of **prime necessity**, and practitioners should never set out on their daily rounds without having a

supply of a few kilos. (It is just as important as an artery forceps, a knife, a needle, sutures, a bottle of chloroform, a midwifery forceps...)

By itself, plaster allows of the securing different parts of the body in whatever position desired. For we are able to maintain that position for the *few minutes* required for the setting of the plaster, but we cannot do this for the long hours which are required to dry any other substance than plaster : silicate of potash for instance.

Plaster, because it adapts itself as we wish it over any part of the body will give us results very superior to all the splints in metal or in wood, including the Bonnet splint or the apparatus of Scultet, which is, besides, much more difficult to fashion than a good plaster.

In a word, with plaster, **every one of you** can manage to make on the spot, alone, without the aid of any mechanician or working orthopedist, **the best apparatus** which can be (for fractures or injuries, or orthopedic affections).

And I can promise you that you will be able to make plasters perfect, *homogeneous, firm, accurate, comfortable and neat*, if you will follow very faithfully the directions which I am going to give in this chapter.

In the first part of the chapter (which you should read each time you make a plaster), we have put together all the indispensable notions. In the second part (which you should read whenever you have the leisure), you will find all the complementary details which you can desire of the technique of plaster apparatus.

INDISPENSABLE NOTIONS ON THE PREPARATION OF A PLASTER

SUMMARY

One should **prefer**, even for the treatment of fracture, **circular plaster**, which fit better, are more agreeable to the patient and easier to make than splints.

In order to **watch over** the affected parts, in a circular apparatus, it is sufficient to make an opening over those points, or to convert the plaster into a bivalve.

To ensure the **good nutrition** of the member under treatment, it is sufficient to be assured of the good nutrition of the extremities of the toes or of the fingers, which should always be left exposed beyond the apparatus.

A plaster is prepared with muslin strips impregnated with plaster paste and applied entirely round the region of the body, covered with a casing of soft tissue.

One must therefore *procure* : first a closely fitting casing, secondly some muslin, thirdly some plaster.

The **casing** is of cotton : jersey, sock, stocking or sleeve of a jersey — according to the region.

This lining is always thinner and more even than cotton wool. It is only in default of such a casing that one would use cotton wool, taking great care to apply it in a layer as even and as thin as possible (of a thickness of not more than 1 or 2 mm).

The **plaster bandages** are strips of muslin about 5 metres long and 15 cm. wide, which have been impregnated with plaster :

a) Either they are **steeped at the time** in **plaster paste** made with 5 parts of plaster and 3 parts of water, **cold, without salt**.

b) Or sprinkled a little before-hand (one or few hours before) with dry plaster in the proportion of 60 grammes of plaster for each metre of bandage ; these strips are then soaked in cold water a few minutes before being used.

To prepare a firm apparatus it is well to insert a support of « attelles », or strengthening pieces, between the layers of the bandage. These attelles are simply pieces of muslin cut beforehand and soaked for a minute or two, before being used, in the same cream as the strips.

These « attelles » (there are two of them) have a length equal to that of the apparatus, a breadth equal to half the greatest circumference of the apparatus, and a thickness of one, two or even three sheet of muslin, according as the plaster is a small or a large one, and as it is for a child or an adult.

If it is a plaster for the arm, which ought to include the shoulder girdle, or a plaster for the lower extremity which should include the pelvis, a third attelle is introduced in the form of a belt, overlapping the upper margin of the two others.

The technique of the apparatus.

Suppose you have to make a **plaster** for the leg.

The leg, being covered with a casing, is placed in position, an assistant holding it and raising it by the foot. You apply the first plaster strip, beginning at the toes and the foot, in circular turns overlapping one third, without making reverses, which are unnecessary. Take care to **apply** the strip: *a) exactly; b) without pressure; c) flattening it well* so as not to leave creases. You ascend as far as the upper extremity of the apparatus, where you cut short the strip if it is not used up.

Over this first layer of turns of strips, **attelles** well smoothed down are applied, one in front, another behind. And over the attelles you apply further turns of strips, making thus a third or fourth covering, according as the case is a child or an adult.

Between the different layers of the apparatus and over the last one some **plaster paste**, one to two centimetres in thickness, is applied. And that is all.

Then, **verify** and rectify, if necessary, the **position** of the limb; **model** the plaster over the osseous prominences of the part by pressing, not immediately upon, but around those prominences; **maintain** it thus until the complete setting of the plaster.

A quarter of an hour later, **trim** the plaster, strengthen it if need be.

Before leaving the house, always make sure of the good **nutrition** of the toes, which will be a guarantee of the good nutrition of the entire limb.

We will take for a type of our description the construction of a **plaster for the leg** beginning from the toes and reaching as far as the lower third of the thigh.

It is the apparatus which should be used for fractures of the leg and for arthritis of the instep.

It should reach as far as above the **knee-joint** because, to immobilize well a portion of a limb, it is necessary always to immobilize at the same time as the segment, at least the two adjacent articulations.

We will now give, *a propos* of this apparatus, all that part of the **technique** which is **common** to all plaster apparatus, whatever they may be. As to the peculiarities of each region, you will find them indicated in the chapters devoted to the different diseases (for the plaster corset, see the chapter on Pott's disease, and for the large plaster for the lower limb, the chapter on hip disease).

A. — WHAT IT IS NECESSARY TO OBTAIN

Three things : *a*) a **casing** of soft tissue; *b*) some **plaster**; *c*) some **muslin**.

a. The protecting **case**¹. — You may find this everywhere; it should be simply a large stocking reaching up to the lower



Fig. 2. — The casing of soft tissue (jersey or "tube") which protects the skin against direct contact with the plaster.

third of the thigh, or better two sleeves of a jersey applied end to end, or even a "tube" of soft tissue.

1. Much preferable to cotton wool, as we will show, p. 62.

If the tissue of the « tube » or casing is very thin you employ two, the one over the other.

If the tube be too large, make it fit at once by means of sewing.

b) **The Plaster.** — This is white plaster of Paris, fine and homogeneous, soft to the touch as starch powder.

Preserve it from moisture, and even from the air, in a glass jar, or in a tin box, hermetically closed; because the plaster deteriorates, that is to say, it becomes moist in time, if kept in a bag, even in a place which does not appear to be damp.

If you take two samples of **good** plaster obtained from different sources, they may not both set in the same time; this depends upon their degree of baking. The moment of setting may vary very markedly in the one sample and the other; and it is to prevent disappointment that I advise you always **to test** the sample of plaster you are using, before preparing your apparatus.

In order to do this, place in a bowl five spoonsful of plaster to three of water (these are the ordinary proportions), mix them well together and note how long this « plaster cream » takes to set.

If you cannot obtain the **white** plaster of Paris, you may use the **grey** (as used by plasterers), coarser, often as gritty as fine sand. To ensure the best chance of its being perfectly dry, take it from the middle of the sack and sift it, if it is not homogeneous. This common plaster should be made of a thicker consistence than the white plaster; you must put a third more plaster to the same quantity of water — remembering that it requires a third more time to set than the white plaster of Paris. You can make good apparatus with this common plaster, though less pleasing, provided it has not deteriorated.

Finally, suppose in a case of extreme urgency, you have only at hand plaster which is a little deteriorated, that is to say hydrated (white or grey plaster); you could dehydrate it and give it back its virtue by baking it for ten or fifteen minutes, in an ordinary oven and in an open receptacle¹, until no more water vapour is disengaged.

The quantity of plaster required. — Take rather too much; say 2 kilos for a child of ten or twelve years of age, and three for an adult (for a leg apparatus).

c. Muslin. — Ask at the stores for stiff muslin number 7 or 8, that is, with 7 or 8 threads to the square centimetre (v. fig. 3).

This N° 8 will not be too close nor too loose; that is the

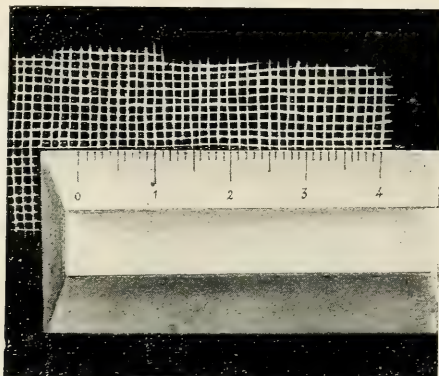


Fig. 3. — The stiff muslin N° 8 used in making the strips and the attelles.
(8 threads per centimetre.)

kind of muslin used by dressmakers for making the patterns for dresses.

1. Where can we procure good plaster? This practical information we are often asked for by practitioners. Well, you may obtain the white plaster of Paris at pharmacists, and at *some* moulders; I dare not say at *all*, because some use in place of plaster, alabaster, which does not fulfil exactly the conditions required.

Procure more than you really want.

Take 7 or 8 metres of the ordinary width, which is 60 or 70 cm.; five metres will be sufficient for a child of 10 or 12 years.

Failing stiff muslin, should the case be urgent, you will find plenty of old curtains, cast off sheets, from which you can cut off strips of 12 cm. in width, and you can join them together end to end, with fine stitching so as not to leave any ridges.

Lastly, you should have two or three basins, **some cold water without salt**, scissors, and a knife.

And ask also for one or two large sheets, which you can arrange so as to prevent the spotting and soiling of the carpet, the bed, or the floor, with plaster.

B. — ASSISTANTS

You should have two assistants (one will be sufficient at a push), to make the apparatus for the leg.

The assistants may not be medical men, but simply two members of the family; you should make them understand how to follow well your instructions and assist your movements.

With these assistants, you should **commence** by **cutting** your **strips** and **attelles** out of the large piece of muslin.

C. — PREPARATION OF THE STRIPS AND ATTELLES

a. The strips. You separate, by tearing with your fingers, a strip of muslin having the following dimensions :

Breadth : 12 to 15 centimetres.

Length : 5 metres.

These are the **ordinary dimensions** of the plastered strips.

Then you take a second and a third strip from the roll of muslin.

The **number** of the strips naturally varies with the build of the subject; for a child under 7 or 8 years, one strip may be sufficient; for a child from 8 to 14 years, two strips; for an adult, three strips (always for a leg apparatus).

b. The attelles. — These are not indispensable, the apparatus could be made with strips alone but it is better to incorporate attelles or strengthening pieces between the layers of the strips. With these “**attelles**” the apparatus are **firmer, more easily constructed, more quickly made, more compact**, more homogeneous, than those made with strips alone, especially if one employs strips which have been sprinkled with plaster beforehand.

The attelles are cut from the remains of the piece of muslin (after having taken the strips from it).

The **number** of attelles : two for each leg apparatus.

The **Dimensions** : the same for the two attelles, namely :

Length, equal to that which the apparatus should have (measuring from the upper extremity, above the knee, to the heel, and adding the length of the sole of the foot).

Breadth, equal to half the greatest circumference of the region to be covered (that is to say, here, half the circumference of the calf).

Thickness, that of two sheets of muslin. It is unnecessary to sew the two sheets together; folded one on the other and flattened with the hand, they will remain in contact.

Here then, are your strips and attelles cut out of the piece of muslin. But you will not plaster them until you have prepared the affected limb and placed it in position.

D. — PREPARATION OF THE PATIENT

The patient remains in bed, or better, is carried on to a table.

The two legs are brought over the edge of the table. The sound leg need not be held, the sound foot rests on a chair.

The Toilet of the Skin. The skin is washed with a tampon damped with alcohol or ether, and is lightly sprinkled with sterilized talc. If there is a wound, one covers it with a square of aseptic gauze, taking note of the place, to make there an opening in the plaster a few minutes after its construction — in view of the dressing required afterwards.

a. Placing in Position.

Two cases :

Either the limb is already in **good position** or, it may be placed so at once (arthritis without deformity, fractures without displacement, or where reduction is very easy).

Or else, the limb is in **bad position** and its correction requires some time, and often even the use of chloroform (fractures or recalcitrant orthopedic deformities).

As for the movements required for correction, this is not the place to describe them, they will be indicated *a propos* of each deformity.

When this correction has been made, it will be maintained by an assistant at the bottom of the table, who will seize the foot and pull it more or less, as the case requires.

If a very steady, strong traction is needed a second assistant may make counter extension by holding the thigh or the knee with both hands and pulling towards the upper part of the thigh.

Manner of holding the foot. — The right hand of the assistant grasps the fore part of the foot firmly, the palm of the hand being applied to the sole, and the fingers on the dorsal aspect. The left hand seizes the heel and the instep, the palm embracing the projecting heel, the fingers on the lateral aspect.

Position of the foot. — 1st. It should be held at 90° of flexion upon the leg, or even at a slightly acute angle. of 80°

for instance; 2nd. The middle of the **second toe** must be in a line with the **crest of the tibia**. — Sometimes in order to obtain a hyper-correction the foot is carried a little to the inner side, or a little to the outer, in an inverse direction to the deformity it is desired to overcome; 3rd. The heel should be made to present its normal projection behind (compare it with the sound side).

b. Enclosing the limb with a casing of soft tissue.



Fig. 4. — One passes the fourreau or " tube " as one puts on a new stocking, folding it back. Whilst an assistant holds the foot by the heel, one commences by covering the forefoot with this folded " tube ".

To prevent any discomfort to the patient while the fourreau is passed on the foot, the assistant holds the heel with one or both hands, and pulls towards him while the fourreau is passed over the toes, gathered up and folded (v. fig. 4); then the fourreau having passed as far as the base of the toes, the assistant leaves the heel and takes hold of the toes and instep with both hands, while the fourreau is passed over the heel and



Fig. 5. — The tube once passed over the foot, the assistant leaves the heel and seizes the forefoot, then, again, the heel. The fourreau is unfolded to ensheath successively the leg, the knee and the lower part of the thigh.



Fig. 6. — Placing the patient in position.

on to the leg (v. fig. 5). The fourreau being in place, the assistant takes hold again of the heel and instep.

The upper border of the fourreau is held by a second assistant, or by the patient himself, **seated**.

If instead of a tube, a stocking is used, its lower end should be split to allow of inspection of the naked toes.

E. — THE PLASTERING OF THE MUSLIN STRIPS AND " ATTELLES "

This is done by simply steeping the strips and attelles in the Plaster cream⁴.



Fig. 7. — Method of preparing the best plastered strips. The strip of stiff muslin is rolled in the plaster cream (three cups of water to five of plaster).

a. Composition of the **Plaster cream**.

Plaster is mixed with water in the following proportions : five cups of plaster to three of cold water, without salt; therefore, **no hot water nor salt**, with which the plaster sets **too quickly**; with those also the **apparatus** is **too brittle and friable**.

1. Cover your hand with vaseline before doing this.

The quantity of the cream to be prepared (for an apparatus for the leg) is one cup and a half of water to two and a half cups of plaster for a child; three cups of water and five cups of plaster for an adult. This quantity suffices amply for an ordinary apparatus for the leg.

If, by any chance, you run short of the plaster cream in the course of constructing the apparatus, you may prepare more at once in another basin, or, if you like, in the same one, but after having thoroughly washed it, for the new cream must not be mixed with the debris remaining from the preceding mixture¹.

How ought one to proceed to prepare the **Plaster cream**? Into a hand basin, first pour all the water required, then all the plaster needed. Stir up **at once, rapidly** and **thoroughly**, so as to make a homogeneous cream, without leaving any grit. This mixing of the plaster requires hardly 15 to 20 seconds.

b. Impregnation of the strips (v. fig. 7).

Immediately the cream is ready you steep the unrolled strip or strips of muslin in it, which allows of their being impregnated "uniformly" and quickly with plaster.

The first strip being impregnated, you quickly roll it up, and the others will be rolled up in the same way by your assistants who have seen how to do it. You tighten each turn as you would in rolling a bandage of ordinary linen, or of linen

1. Mix the two pastes? never! nor will you ever add water to a cream which is too thick, and has been mixed several minutes; this would "drown" and "kill" the plaster, one would only have "dead" plaster (to use the technical term). One would "turn" the cream.

To add plaster to a cream too thin is not so bad as to add water to a cream which is too thick, nevertheless it is undesirable and should be avoided.

When you find, after a few minutes, that you have not sufficient cream, **you will make a new supply**, in a perfectly clean basin. In the same way, if it ever happens **after a few minutes**, that you find your cream is too thin, or too thick, throw it away, wash out the basin and make a new supply, which should be more or less charged with plaster as may be required.

soaked in silicate of potash, which nearly all of you have learned to do. In a word, do not tighten too much, nor too little; and the strips will thus retain just the quantity of plaster you wish, and you will be able to apply them one after the other without having to squeeze them, or at any rate very little.

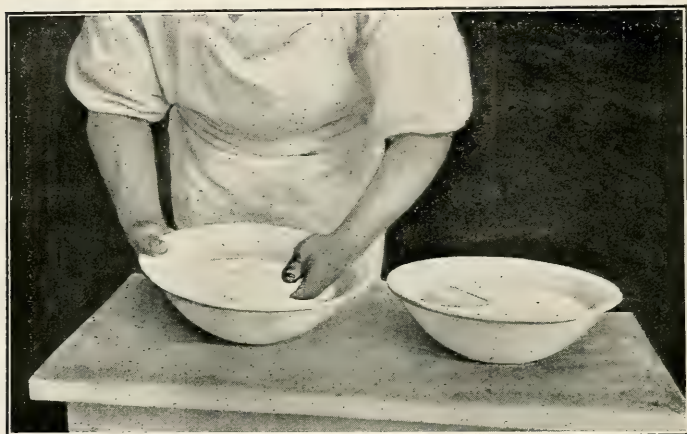


Fig 8. — In the basin on the right, a bandage has been rolled in the cream, in that on the left, the plaster intended for the preparation of attelles is being stirred.

The rolled strips are left in the basin while you go on plastering the attelles (Fig. 8).

c. Impregnation of the Attelles (v. fig. 9).

In a second basin, in which you have prepared a fresh supply of cream, or have poured the excess of that prepared for the strips, but which you have not used, you soak the attelles, **one by one, folding** and thoroughly impregnating them.

The impregnation of the attelles requires scarcely a few seconds (say, 15 to 20 seconds).

As soon as the strips and attelles are impregnated, they should be applied. But, before indicating the method of making this application, we ought to explain a second method of prepa-

ring the plaster strips which is found recommended everywhere : the sprinkling of the strips with dry plaster, beforehand.

Plaster strips, prepared beforehand.

This procedure consists in *impregnating beforehand* the muslin strips *with dry plaster*, placing them afterwards in reserve, several days or several weeks.



Fig. 9. — Method of soaking the attelles in the cream : they should be impregnated a little at a time, piece by piece, and not all at once and *en masse*.

until they are wanted : it is then sufficient to dip them in water a few minutes before applying them.

Yes, but remember it is **difficult enough** for those not accustomed to it, to prepare in this way bandages having the **desired charge of plaster**.

Now, if too much plastered, they will not allow of being well “soaked” and will retain in places gritty particles of hard plaster; when there is not sufficient plaster, the apparatus will be soft and friable, like a “*gâteau feuilleté*”. More than that, the plastered strips prepared more or less a long time beforehand, run the risk of decomposing; that is to say, of deteriorating and becoming hydrated.

And this is the reason why I advise you, in a general way, to prepare your strips in the manner first described (in the cream) which is moreover the simplest and surest method of obtaining homogeneous and firm apparatus.

Notwithstanding, I do not absolutely prohibit your having recourse to the second method; there is one case even where it would be better to use it. This case is when, having need of a large number of strips in order to make a large apparatus for Pott's disease or Coxitis, you have not at your side three or four capable assistants, who after having seen you plaster the first bandage



Fig. 10. — To prepare plastered strips beforehand, one sprinkles 60 to 70 grammes of plaster in powder over each metre of muslin (15 c m wide); one rolls the strip with the right hand whilst the left hand spreads the plaster

in the cream, plaster all the others, **whilst** you yourself apply the first strip (and all the following ones).

If you are alone in making such large plasters or, if you have only one assistant, you run the risk of being much retarded by this preliminary preparation of all the plastered strips required, and of finding, after having plastered the last, that the first one in the basin is already hard and unusable.

So that, **in this particular case**, I recommend you to use **bandages already powdered**.

To produce good ones, you will take the following **two precautions**;

1st The strips will be plastered to the proper degree — neither too much nor too little — by incorporating **60 to 70 grammes of plaster** to each **metre** of muslin (15 cm in width) : altogether, 300 grammes of plaster to the entire bandage of five metres.

Thus, you will divide your pile of 300 grammes into five small heaps and use one of the small heaps with each metre of strip. The sprinkling of the strip is very easy : you do just as in preparing a whiting for frying.

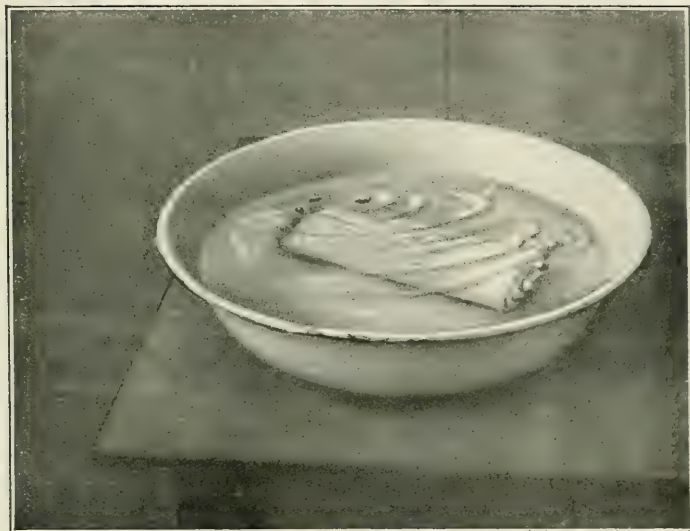


Fig. 11. — The sprinkled strip is dipped into a basin of water : some bubbles of gas are at once disengaged : and when no more gas comes off, it is ready for use ; take it out, press it, and apply it.

2. So as not leave the strips to decompose, preserve them in a **tightly closed** receptacle until you use them, or better still, do not sprinkle them until a little while (**1/4 to 1/2 an hour**) **before** you prepare your apparatus.

When you wish to construct the apparatus, dip two of these strips into a basin of water, so that each of them is entirely immersed (v. fig. 11) ; leave them soaking until you no longer see bubbles of air on the surface of the water (about 2 or 3 minutes) : at that moment, take the first strip, squeeze it thoroughly and wring it, holding it by the two ends (v. fig. 12) and set about applying it.

As the strips should not be left too long in the water, because they would harden and become useless, care must be taken that, where a large number of strips are being used, — as is obviously the case in making a plaster corset for an adult, — they are not all put in the water to soak at the same time, but dip-

ped in successively, at intervals as nearly as possible equal to the time taken in applying one strip to the patient.

Then, the first strip having been applied, and before removing the second from the basin, you place a third to soak; before applying the third you dip a fourth, and so on.

As to the **plastering** of the attelles (when the strips have been prepared



Fig. 12. — The best method of holding and squeezing the wet plastered strip.

by the second method of previously sprinkling) is should always be done in the aboved described manner, soaking the attelles in the cream.

F. — APPLICATION OF THE PLASTERED STRIPS AND ATTELLES

Immediately they have been plastered, as we have said, the strips and attelles should be applied **without any delay**, for the cream prepared in the proportions indicated above (5 parts of plaster to 3 of water) begins to “set” in about ten minutes.

The strips and attelles must be applied in **less than ten minutes** in order that there remains, at the very least, two or three minutes before the setting of the plaster, to correct the position of the limb and to effect any "modelling".

But let me assure you that you will always find it easy, in the case of a leg apparatus, to be in time. You will have to allow pretty nearly for each



Fig. 13. — First strip : begin at the extremity of the foot, at the base of the toes.—
Apply without tightening; spread out the strip.

stage : *a*) for applying the strips : one to two and a half minutes at the most; *b*) for applying the attelles, about as much. Altogether, five or six minutes at the most : there are then fully five minutes more (which is more than you need) to correct the position and effect the modelling¹.

1. But if it is very easy to finish in good time in preparing a leg apparatus, it is much less easy to do so in preparing a large apparatus, for Pott's disease, or even for coxitis, when one is "out of practice". Consequently for these large apparatus you should prepare a thinner cream (to 5 parts of plaster put 4 parts of water instead of three) that will give you five minutes more margin, that is to say the setting of this cream will take about fifteen minutes. But we will return to this, *à propos* of the plaster corset.

a. The application of the strips.

Take a plastered strip, — without squeezing it, or scarcely at all — and apply it by commencing at the extremity of the toes.

Mode of application of the strips. — One makes **circular** turns which overlap a half or third, but one never “reverses”. That is not necessary with bandages which are soft and moist : **they mould themselves** to the contours of the limb and fold



Fig. 14. — *How not to do it.* Do not let the bandage make creases upon the instep as it is doing here.

themselves lightly where it is necessary without those folds causing wounds, for they are very small and even smaller than those you would make with reverses.

These circular turns overlapping one another thus cover the foot, the instep, the leg, the knee, and ascend up to the lower third of the thigh.

The topmost turn of the plastered strip should cease 1 cm. below the upper border of the jersey.

Three recommendations as to the manner of applying the strip; **spread** it out : apply it **exactly** but **without** traction.

1. *The spreading out* : avoid making twists, but without being in the meantime concerned about the inevitable (and negligible) small folds occurring in the strip rolled round a region not regularly cylindrical (fig. 14). Rather than make a "twist" cut your strip and spread out the ends. If care be



Fig. 15. — The creases which the strip may make are effaced by the left hand as soon as they are made.

taken to spread out the strip the apparatus will not cause any wound.

2. To apply the plastered strip **exactly**, follow carefully the contours of the region. You can flatten out with the left hand, as you go on, each turn applied by the right hand (v. fig. 15). And in this way you will have a well fitting apparatus, neither loose, nor slack.

3. Do not tighten (a mistake often made by beginners). Avoid causing oedema of the limb (v. fig. 16) : make no trac-

tion, no pressure. Take care not to pull on the strip, as you would on an Esmarch's bandage. Apply the strip as if you had to take an impression of the contour and the volume of the limb, without adding or curtailing anything, and in this way you will have plasters which will cause no discomfort.

The first covering having been finished, when with the ban-



Fig. 16. — *What you should avoid.* Do not pull on the strip for, in pulling, the limb is constricted as is shown here.

dage you have arrived at the upper border of the apparatus, if the strip is not used up, you will tear it with your hands, or better, cut it with scissors, and keep the remainder to apply later on over the attelles.

b. The application of the Attelles. Over the first covering made with the strips, the two attelles are applied (fig. 17, 18 & 19). You take one of them, it does not matter which (they are equal); squeeze it slightly; spread it out and apply the **first one behind**. Spread out one of it's extremities, first under the toes where the assistant takes hold of it and keeps it in position,

then along the sole and upwards under the heel, which it encloses afterwards, over the whole of the posterior part of the limb, under the back of the knee as far as the upper border of the apparatus where it's extremity is held by someone, or by the patient himself¹.



Fig. 17. — Posterior attelle : begin its application under the sole of the foot.

The other attelle — **anterior attelle** — is applied in front, beginning also at the toes².

1. If you wish to protect the toes from the pressure of the bedclothes you may allow the lower end of the attelles to project two or three centimetres beyond them. If by doing so your attelle is too short at the upper part, it is of no consequence : you will only have to strengthen, by some supplementary strips, this part of the apparatus, where the attelle is wanting.

2. But without going further, without going even as far as their extremity, one leaves bare the last joint, in such a way as to allow of constant inspection of the skin. You could also take no notice of this recommendation during the construction of the plaster, and cover, without hesitation, the dorsal aspect of the toes, provided that you liberate it when you trim the plaster.

You carry out the application of the attelles, at the same time spreading out and smoothing down their edges in such a manner as to avoid any sharp projection, which is very easy with attelles so thin as these (made, as I said, with one or two sheets of muslin).

The edges of the attelles will overlap each other at the level of the narrow parts of the region, which is an advantage.



Fig. 18. — The application of the posterior attelle (continued). While the assistant keeps in place the plaster portion, you spread out the middle portion under the calf.

To facilitate and perfect their imbrication you may incise the edges with a cut of the scissors at the level of the malleoli and the heel.

Over the attelles a covering is made with plastered strips : one uses one or two strips (according as one is dealing with a child or an adult). The strips are rolled from toe to thigh, and then from thigh to toe — until the strips are used up.

An important detail.

Between the different layers of the apparatus you spread

with your hand a layer one or two millimetres thick of plaster cream: you use, for that purpose, what remains of the cream after the plastering of the strips and attelles; or if none of it remain, you at once prepare a new supply.

This layer of plaster cream is the **mortar**¹ which binds into a single homogeneous block the different parts of the apparatus.



Fig. 19. — The posterior attelle applied. It encloses half the circumference of the posterior aspect of the limb, after the fashion of a casing.

Then, over the last strip, spread a final layer of cream, to give a finishing touch² to the apparatus.

It is now complete.

The application of the strips and attelles should occupy from three to four minutes, not more than five.

1. Without this mortar one runs the risk of having the plaster not homogeneous (a "gâteau feuilleté") especially if it has been prepared with strips dusted beforehand with plaster.

2. We will explain further on, p. 79, the method of polishing the apparatus.

You will have then, *before the setting* of the plaster, several minutes which are necessary for correcting the position and moulding the apparatus.

« Several minutes », that is the desired margin; not too much nor too little. You should have calculated everything so



Fig. 20. — The anterior attelle is then placed in position.

that this may be so; that is to say, you should not only have tested your plaster beforehand, but more than that, if you are a novice you should have made a rehearsal and constructed a plaster on the same plan upon a living model.

But would it not be possible, when you have not settled on your plan and taken the necessary precautions, to advance or retard slightly the setting on the plaster?

To **hasten** the setting it is recommended in some books, to dry the surface of the apparatus with hot napkins, or with several turns of dry linen bandages which you take off in a

1. See, p. 29.

little while, or to powder the damp surface of the apparatus with a layer of one to two millimetres of dry plaster, or, better still, to lay on both aspects of the apparatus two pieces of dry muslin.

But, I advise you to do nothing of the kind, and not to use any of these means, which spoil the plaster; use simply... a little patience: and so, the setting not having been « forced », the plaster should be firmer, more homogeneous and more presentable.

As to the methods of **retarding** the setting, all those which have been proposed are uncertain or even objectionable; they aggravate matters instead of improving them and tend to « turn » the plaster.

No, if the plaster appears disposed to dry a little too quickly, the only thing to be done is to out-do it in quickness and to roll the last layer of bandage so as to hasten the modelling¹.

G. — VERIFICATION OF POSITION AND MODELLING

a. Verification of Position. — Verify and rectify if need be, the position of the assistant who holds the foot; and even take his place in this delicate rôle, if you are not sure of him and put him in yours to perform the modelling, which is assuredly more easy than putting in good position the foot and the leg.

If you have to pull on the leg, change now and then the position of your hands so as not to exercise a continuous pressure on the same point, which might cause an abnormal projection of the plaster within, at this point.

1. Once again, you will avoid all these annoyances by testing your plaster beforehand. And if, in spite of everything you fail in your apparatus, if for example you find the first layer set before having applied the last strip, well! you will at once have to take off the apparatus — which is easy — and begin again. That has happened to us many times, and we do not consider it any discredit. You have always the resource, to save your reputation, of attributing the premature setting to an over baking of the plaster.

b. **Modelling the Plaster.** — The plaster is modelled by impressing it around the osseous prominences (*not upon* them, which might produce sloughing, *but around*) in such a way as to accommodate the prominences in depressions of the plaster. Here, at the knee, the modelling is done by enclosing the region with both hands, like two spherical covers; the plaster should mould itself over the patella and the condyles. Press



Fig. 21. — Modelling of the apparatus around the patella and heel.

it into the groves which lie between the patella and the condyles.

In pressing it one suppresses the bridges which it makes at these points; one prevents in this way the knee and the leg turning in the apparatus.

In a word, one utilises all the protruding parts (condyles, patella, tuberosities of the tibia) of the knee joint, which form so many keys between the leg and the plaster envelope. That is to say, one models the plaster in this way above and below the knee, around the femoral condyles and the tibial tuberosities. One is able also, to slightly model the malleoli and the

arch of the foot, but this is practically useless : in any case, the modelling will be easily effected with the two hands which grasp the foot and the malleolar region. You should **preserve the correction** and the **modelling right up to the setting** of the plaster, **inclusively**; it is sometimes rather trying, but it is absolutely indispensable, if you wish to lose none of the



Fig. 22. — When the plaster is **set** you raise the heel so that the air passing beneath the apparatus assists the drying (do not confound the *setting* of the plaster, which requires several minutes, with the *drying*, which requires several hours and even sometimes several days).₃

correction obtained. One recognises that the **plaster is set** by it no longer creasing on the surface; by it emitting a sound under the finger, when tapped; by it being warm, remembering however that when it has been prepared with cold water, it will not always be warm to an appreciable extent, even when the plaster is good. When the plaster is set, and then only, you may release the patient's foot and place it on the table, or better still, on the back of a chair, to hasten the drying of the plaster.

II. — TRIMMING THE PLASTER

Ten or fifteen minutes after the plaster is set, you may commence trimming it with a good knife, cutting gently and slowly upon the apparatus, which at this moment, permits of being cut like soft card-board; you cut off the part which covers the extremities of the toes, in such a way, as to expose



Fig. 23. — Trimming the plaster by means of a knife or bistoury.

the dorsal aspect of the last phalanx. One takes care not to cut into the jersey or stocking, in order to preserve a surplus of the covering which will prevent the friction of the plaster over the bare skin. One frees, in the same way, the upper part of the apparatus, preserving, here again, 2 or 3 cm. of the soft casing beyond the border of the plaster.

Thanks to this trimming of the lower extremity of the plaster, one is able to make an easy and continuous *inspection* of the nutrition of the toes. (If all be well with them, one is assured of the good nutrition of the foot and of the leg).

The toes ought to be sensitive to the prick of a pin, rosy, warm, and supple.

You must always look at them before leaving the house and it will be sufficient afterwards if someone of the family watches



Fig. 24. — The apparatus complete, trimmed and polished.

them every hour for the first day, then morning and evening on the following days, drawing a pin over the surface of the toes¹.

1. Anyone may easily perceive the least troubles or anomalies of this kind; it will be sufficient for him to compare the results of examination of the affected side with that of the sound side; moreover, in case of doubt, this person should advise you immediately, and in this way, if any trouble whatever should happen, even unexpectedly, during the following days, you would always be able to remedy it in time.

If the patient is unable to *move them voluntarily* you should open the plaster by a median slit from top to bottom, until they do move.

You split the plaster first on the middle of the dorsal aspect of the foot, afterwards on the anterior aspect of the instep, and with a spatula, or even with the hands, you widen, for one or two centimetres, the still soft edges of the plaster, stopping the instant that the normal sensibility and colour of the toes return.

If these do not return, you widen more and split the plaster, further and further upwards, if need be up to the upper border, and raise the edges. Then, everything should return to the normal.

You have only then to fix the plaster at this degree of widening with a plastered strip, or a simple muslin bandage. In short, provided that you never depart from this **absolute rule of never leaving your patient** without having **positively ascertained** that the toes (or the fingers) are **rosy, warm and sensitive**, I can guarantee that you will **never have serious trouble** with nutrition after the application of a plaster, be it the lower limb, or the upper limb.

After the trimming, the patient is carried to his bed.

The Method of lifting and conveying a plastered subject, so as not to injure the apparatus.

Take hold of the leg in such a manner as not to make any movement contrary to the position given, or which tends to call into play the articulations fixed by the apparatus. One leaves the plastered leg exposed, the heel raised so that the drying of the plaster may proceed as well below as above (v. fig. 22).

Do not confuse this drying with the setting; the latter does not require more than ten minutes, while the former requires one or two days, sometimes more; during that time, one should guard against moving the patient, for the plaster,

so long as the least moisture remains, is likely to break; however, if it were to break, it would be quite easy to repair it; we will describe how in a moment.

Attentions to be paid after application of the plaster

The plaster being constructed, your immediate labours are ended. The patient being returned to bed, a hot water bottle



Fig. 25. — If the small toe is too much pressed upon, you free it by making small slits along the external border of the foot (one frees the internal border of the foot in the same way if the great toe be too much pressed upon).

may be placed on each side of the plaster to hasten its drying. The toes must be protected against the pressure of the bedclothes, thus facilitating the circulation of air round the apparatus, and helping the drying. It is well for this purpose, to leave the plastered region outside the bedclothes, for the first twenty-four hours.

A plaster ought not to cause any more discomfort than a well made boot.

At the most, the patient may complain of a sensation of

uneasiness, similar to that caused by a new boot. If you call on your patient a few hours afterwards, or the next day, he will tell you perhaps that he feels some uneasiness at the edges of the apparatus; the two outer toes, the great and the small, may be a little pressed upon by the plaster. In that case, introduce a spatula between the toes and the apparatus, and

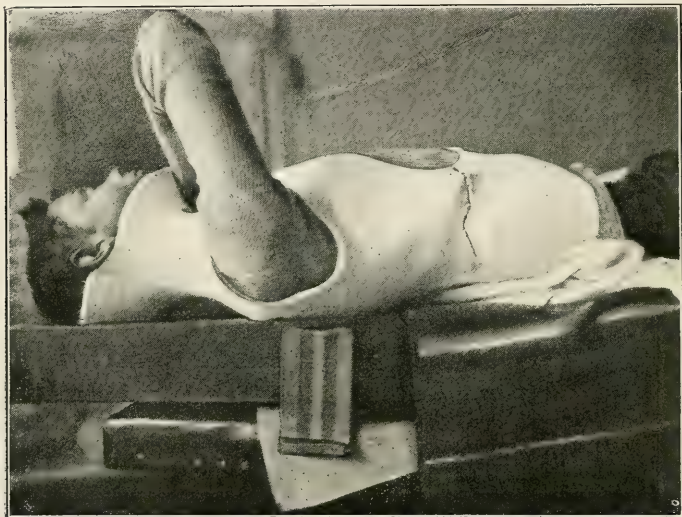


Fig. 26. — A broken apparatus, which must be repaired and strengthened.

try to widen it by a few millimetres. If that is not sufficient, split the plaster a little; do not clip it transversely; no, **cut longitudinally** the inner or outer side (as the case may be), for a length of one, two, or three centimetres, beginning at the free edge; afterwards widen slightly the two lips of the gap, in order to give the toe a little more liberty (fig. 25).

And the same in the thigh, if the upper edge of the plaster presses into the soft parts, commence by sliding under the edge a slender and even pad of cotton wool, and if, in spite of that, the patient still complains, split the apparatus for the length

of a few centimetres, widen the lips of the gap made, and introduce a layer of cotton wool to protect the skin from injury.

We will now describe :

- a. The method of **strengthening** the plaster;
- b. The manner of **repairing** it;
- c. The method of **making openings** into it;



Fig. 27 — How to repair a plaster. — After having slightly moistened the region with *very thin* cream, you apply a large square of muslin, of one thickness only, impregnated with the cream, then a second, then a third.

d. The method of **removing** it and performing the **toilet** of the limb.

a. **How to strengthen the plaster.**

If the plaster seems too slender, whether it be some minutes, some hours or some days afterwards, you strengthen it in the following manner.

It is the **whole** of the apparatus which needs to be strengthened. You commence by applying over the whole surface a

layer of thin plaster cream (equal parts of water and plaster), then, over this, you spread two attelles (of a single layer of muslin), one of the attelles in front, the other behind, then a third, and a fourth (always of one thickness only); and over all you roll one or two plastered strips. If it is only at **one** or **two points** that the plaster is weak you apply, at these



Fig. 28. — Over the squares, several layers of plastered strips are applied.

points, going beyond the limits of the weak portion, a similar layer of plaster paste, then several squares of muslin (fig. 27), lastly, 2 or 3 turns of plastered strips (fig. 28).

b. How to repair the plaster.

And when the plaster is cracked, or broken completely (fissure or fracture) a long or short time after its construction, it is not generally necessary to replace it; one may very well repair it and make it sound again (fig. 27, 28) proceeding in pretty nearly the same way as in strengthening it.

First of all remove the debris of plaster which borders on the crack, then roughen the surface with a knife; you hollow

out little depressions with the point, as you prick the ice with your alpenstock to obtain a grip; you damp afterwards the irregular and jagged surface with some thin plaster (equal parts of plaster and water).

When the plaster is soiled, its whiteness can be restored



Fig. 29. — How to make an opening in the plaster. — The piece to be removed is first marked out, then cut with a knife, going through the whole thickness of the plaster; this piece is lifted out by one corner and removed altogether.

by the application of a film of paste made with these same proportions of plaster and water.

When it is softened by urine or by pus, the soiled part is cut out and replaced by squares or attelles held in position by a few turns of plastered strips.

Do not use thick paste or attelles of several thicknesses; this is the secret of success in these immediate (or late) reparations, which pass as difficult. If the paste or the attelles are too thick the new pieces will not incorporate with the old plaster, whereas in the method I have just described, the union

is very intimate and very firm, and you will be as expert in repairing the " old " as in making the " new ".

c. How to make an opening in the plaster.

To make an opening in the plaster, as in trimming, you cut layer by layer, very gently, until you experience a sensation



Fig. 30. — When the piece is removed one cuts the jersey diagonally and folds back the flaps : the skin is laid bare.

of cutting the tissue of the jersey, and no longer the plaster.

There is often an indication for the making of an opening :

To inspect a projecting fragment of bone, a wound, an abscess, a fistula, etc.

One ought to note these different points and protect them by a double square of gauze, when constructing the plaster.

Wait, before making these openings, until the plaster is dry (at least 24 hours), unless however it be a matter of urgency, for example in the case of a wound suppurating freely, which should be dressed the same day, or again, that of a bony projection which ought to be put back as soon as possible, if

you wish to save the already threatened skin: in these cases, make the opening half an hour after the plaster has set.

Just as in trimming, one makes use here of a knife well sharpened; cut millimetre by millimetre, until you come upon the soft tissue of the covering which you will more easily slit with the scissors.

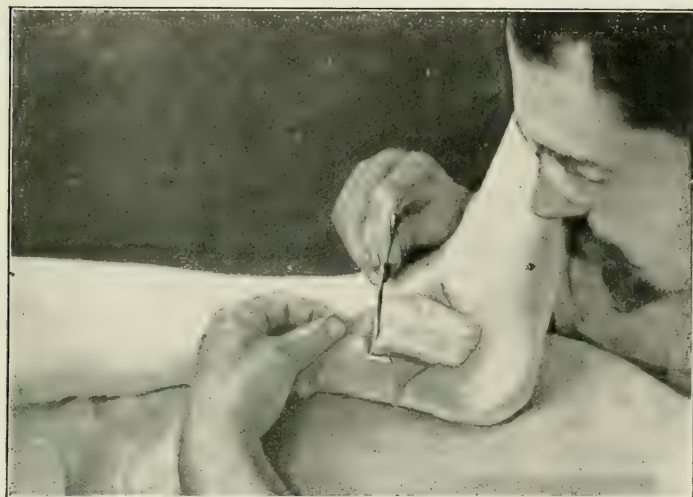


Fig. 31. — In the case of a wound: method of introducing the dressing beneath the edges of the opening.

You will not wound the skin if you proceed cautiously. The security will be still greater if you have remembered to cover the skin with a double jersey; it is then that you appreciate the value of this precaution.

Another good precaution, when you know beforehand that you may have to make an opening at some points, is to place there (over the jersey, single or doubled), a little square of gauze of two thicknesses, or some fine cotton wool, before applying the first plastered strip. Thanks to this square, one is able, later on, to make an opening in the plaster at this point, without the fear of wounding the skin.



Fig. 32. — The flaps of jersey have been turned down over the dressing.

The opening, generally square, should exceed by several centimetres, in all directions, the point to be watched or treated.



Fig. 33. — The dressing is retained by a Velpeau bandage.

One closes the opening with an ordinary dressing if one is dealing with a wound (fig. 31), or, if one is dealing with a correction, with squares of cotton wool kept in position and well flattened by a few layers of stiff muslin, moistened and squeezed; or better, with a Velpeau bandage (fig. 32 and 33).

D. How to remove the plaster.

The time having arrived for the removal of the plaster¹

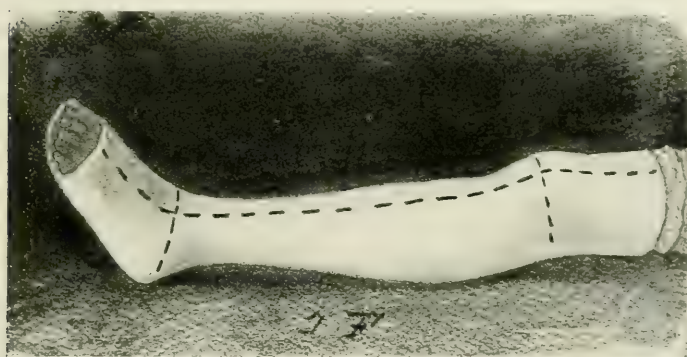


Fig. 34. — How to remove the plaster. — The lines of section.
(The plaster has been previously softened by a bath or by warm wet compresses.)

it is split in front, in the same manner and with the same precautions, as I indicated for trimming and making an opening. with this difference, that when the plaster has just been constructed it allows of being cut easily (or even some hours or some days afterwards); whereas when some weeks or months older, it does not allow of being cut without some difficulty.

For this reason, you should commence by softening the old plaster on a level with the line which the knife is going to follow. You damp it 10 or 15 minutes beforehand with sponges or with linen soaked in hot water. This facilitates

1. After some weeks, or may be months, according as it is a fracture or an orthopedic affection.

very greatly the penetration of the instrument, and when it has cut a little way into the plaster, you keep on running some hot water along the groove; then you go on, in this way, damping and cutting, right down **to the jersey**; then you cut the jersey with the scissors.

But this method of removing the plaster is long and laborious; it is infinitely more simple to plunge the patient, or at



Fig. 35. — How to cut the softened plaster by means of a knife: you raise the sides of the cleft to avoid wounding the patient.

least the plastered limb, into a hot bath, for 15 or 20 minutes, whenever this is possible, that is to say nearly always. As soon as the patient leaves the bath, start upon the plaster with a good knife. It will allow of cutting as easily as cardboard, and the section and removing will occupy one or two minutes (fig. 34 and 35).

This preliminary softening in the bath affords a still greater security: the edge of the soft plaster allows of it being raised sufficiently by means of the fingers for you to be able to slip easily the handle of a spoon between the plaster and the skin, and you can then cut safely upon this improvised

guide which you advance little by little towards the other extremity of the apparatus.

At the instep one is often delayed in making a complete section by abutment of plaster which corresponds to the angle of flexion of the foot (fig. 36). But, if one proceeds with caution, one can divide this plaster obstruction without scratching the skin.

As soon as the plaster is thus cut through from top to

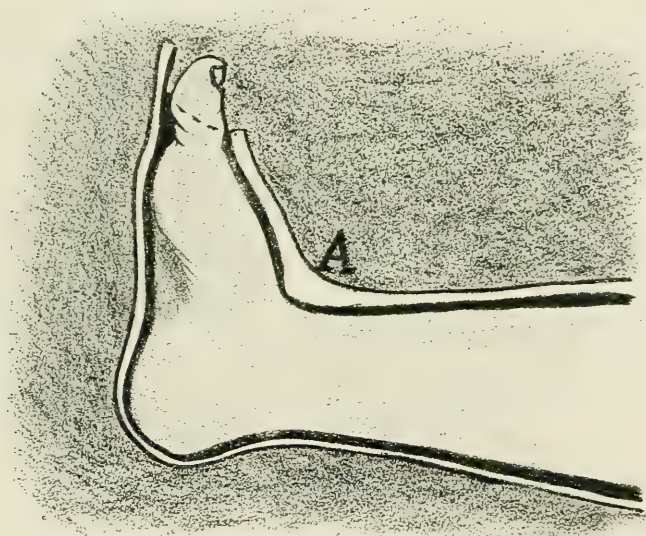


Fig. 36. — At the instep there nearly always exists a buttress of plaster which is awkward to cut.

bottom in the median anterior line, one separates and raises the sides and so can remove it without difficulty. At the instep, however, I would advise you to make a second section at right angles to the first, before raising the sides. This second transverse section is always indispensable when the plaster has not been softened by a bath; it proves very advantageous in any case; not only at the instep, but also at the knee (v. fig. 34).

When you proceed to the separation of the sides (especially when the plaster has not been softened) you should move with prudence and method, making the effort symetrically and equally, on the two valves of the plaster. Otherwise one twists the limb and, in the case of a debilitated child, or one in whom the skeleton by disease has a lessened resistance¹, there is a



Fig. 37. — To remove the plaster, an assistant separates the sides while you raise the limb and pull upon the foot.

risk, by such torsion, of bending or even fracturing the bone.

A good precaution is to confide to an assistant the task of pulling very firmly on the foot, whilst you proceed, alone or assisted, with the raising and separating of the two valves of the apparatus.

The toilet of the skin after removal of the plaster

If one need not replace the plaster apparatus again, one is free to make the toilet of the skin in several stages. But, if

1. For example in the case of a congenital luxation of the hip, or in one of tuberculosis of the member.

it is necessary to re-plaster the limb, one makes the toilet at once.

One uses for this warm water and soap, afterwards damping slightly the skin with some ether or Eau de Cologne. If the skin is very scaly you may commence by rubbing the skin gently, for a few minutes, with vaseline, which has the effect of softening the scales of epidermis; you wash the skin with a tampon of ordinary cotton wool and pour over it a little ether or alcohol. Then turn the patient gently over, to make the toilet on the other side of the limb.

If, as is most unusual, you find, after removing the plaster, some slight alterations in the skin, eczema, or vesicles, you will attend to these carefully for a few days before replacing the plaster, by applications of oxide of zinc, or talc or, better still, by radiotherapy. Failing the latter, you may leave the skin, with great benefit, without any dressing, lightly covering it with a piece of gauze, exposing it freely to the air for a few days, or better still, to the sun for 10 minutes the first day, 15 the second, gradually increasing by five minutes a day.

II

SUPPLEMENTARY DETAILS¹ ON PLASTER APPARATUS

GOOD AND BAD PLASTERS

I have said that *to know how to construct a plaster* forms part of that minimum of information *indispensable* to all practitioners and



Fig. 38. — A bad plaster.

1. Consult that excellent book of my assistant in Paris, Dr Privat, “On plaster apparatus”.

nevertheless, there are few practitioners capable of making a good plaster; not that it is really difficult, no! but it is not taught in our schools. For that reason I must explain to you here, in detail, that which makes good and bad plasters.

Bad plasters.

I mean by bad plasters¹, plasters which are soft, friable, those apt to lose their shape, heavy, ill fitting, consequently quite incapable of fulfilling their therapeutic function.



Fig. 39. — Another bad plaster. — These two figures 38 and 39 show *how it should not be done*. — Here are two plasters, much too large and not moulded: veritable floating trowsers.—One easily sees that a plaster made in this way (one saddle for all horses) is not fitting better than the glass case over the clock and is incapable of thoroughly maintaining a correction.

These plasters, no more moulded to the body than a sentry box to a sentinel, are nothing more than *cache-misères* and deceptions; they cover but do not support; they hide a deformity, but they do not

1. Are the plasters of all "specialists" really beyond reproach? This is like asking: Do all surgeons succeed in procuring a faultless asepsis? — Do we not find among them, some who work by routine, who have indifferent principles, and who, alas! are unwilling to depart from them. But, as you know, there is no one so deaf as he who will not hear... And still, it is not

correct it. Moreover, they are uncomfortable or painful to bear; they fatigue or injure — like a badly made boot (fig. 38 and 39).

And yet, it is absolutely necessary that medical men should know

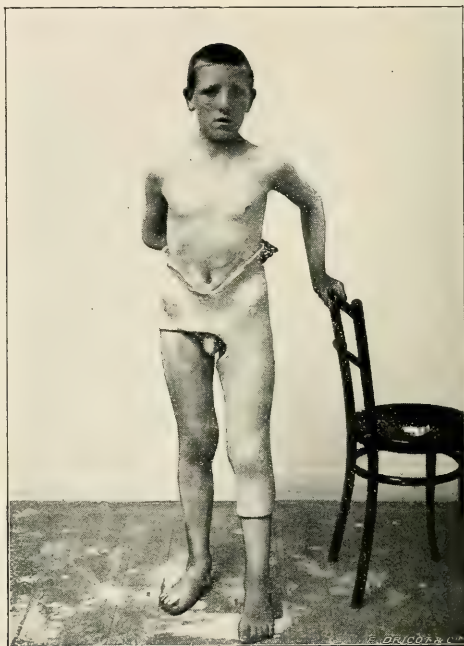
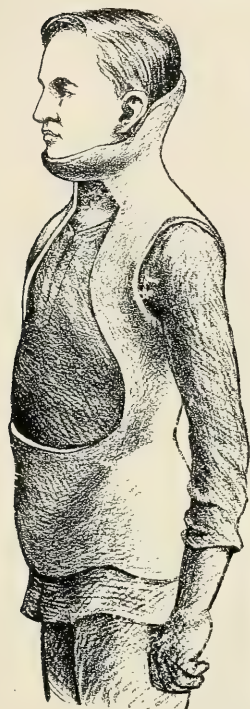


Fig. 40 and 41. — Here are two good plasters : accurate, well moulded.
Compare them with the bad plasters in fig. 38 and 39.

how to make good plasters ; for **without well made apparatus there can be no good orthopedic cures.**

Good plasters.

The good plaster is that which supports and does not inconvenience; those are its two essential qualities; if, into the bargain it is elegant, then the plaster is perfect (fig. 40 and 41).

more necessary to be a professional surgeon in order to be aseptic than it is necessary to be a specialist in order to make good plaster; you will succeed completely if you follow the technique here indicated.

How to make a good plaster (well fitting, comfortable and neat)? First of all, it should be a **circular** plaster (made with strips) and not a **plastered gutter** (made with the classical sixteen folds of muslin).

The **superiority** of the **circular plaster**. — It is by far the **most accurate** (since it adapts itself to the depressions and reliefs of the whole surface of the body); it is the **most comfortable** to the patient (because it supports him uniformly everywhere); and it is the **most**

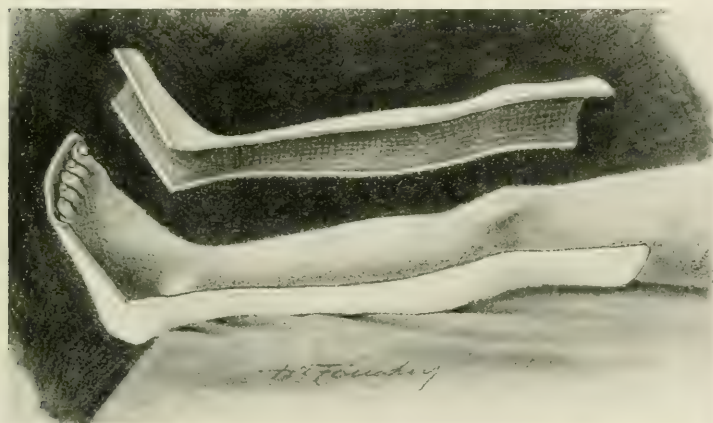


Fig. 42. — A bivalve apparatus allowing of complete examination of the limb, if need be, or the dressing of multiple wounds (The two valves are kept in contact by means of a sticking plaster bandage).

simple to make (because, to mould well no matter in what region, it is sufficient to roll the plastered strips after the fashion of an ordinary muslin bandage, whilst it is impossible to mould exactly the plastered « gouttière » made up of 16 folds of muslin, without making coarse ridges which may wound the skin).

But, at once, you ask :

a) How do you **inspect**, in circular plasters, some bad or suspected point (a fragment of projecting bone, a wound, an abscess or a fistula)? It is very easy : simply **make an opening** at that point, which opening will not lessen the support, on the contrary, as we use it (this

1. The circular plaster is the best for the limbs as well as for the trunk, for fractures as well as for orthopedic affections.

opening) one can exert more pressure on a certain point, to push back a bony projection, a gibbosity.

b) How, with a circular plaster, can you make a complete examination of a limb, if necessary?

First, **this complete examination** will be rarely indicated; moreover, could it be better made with a plaster gouttiere? And besides, remember that this examination is, in reality, **possible** (and even easy) with a circular plaster, seeing that it is sufficient to divide the plaster into two valves which you can take off and reapply as you wish.

c) Finally, how are you to inspect the **nutrition** of the limb, in a circular apparatus?

It is sufficient to ascertain the good condition of the toes and fingers, as we have already said.

Any **alteration** in their *colour, warmth, sensibility*, is the **danger signal** which allows one to know that there is trouble with the nutrition higher up, and to do at once what is necessary to remedy it certainly; it is the **danger signal upon which you can always rely**.

Besides, these troubles of nutrition can only arise from some fault in the construction of the plaster, or from the breaking of one of the rules I have given.

But do not believe that this danger does not exist with gouttieres. It does. I must even confess that the only really serious accident which I have ever observed to be caused by a plaster, occurred 25 years ago, in the course of my studies. After the application of a plaster gouttiere to a fracture of the leg (of an alcoholic subject, it is true), total gangrene of the foot, and even of the lower part of the leg, occurred beneath a sub-malleolar bracelet of diachylon.

A. — HOW TO MAKE A PLASTER WHICH WILL SUPPORT WELL?

In order to support well, a plaster should fulfil two conditions: first it, should be **sufficiently long**, and, secondly, it should be **moulded** to the region.

a) **The apparatus should be sufficiently long.**

It is necessary that the plaster should embrace not only the part affected, but also the two adjacent articulations¹.

1. I was asked to see, in a large foreign capital, a patient suffering with Pott's disease in the dorso-lumbar region, who had had applied a plaster belt, reaching from the axilla to the iliac crest, the shoulders and the pelvis being entirely free! The patient, as you may well believe, moved about inside it rather like Diogenes in his tub. And still, to speak properly, the formula

Thus, to completely immobilize an affected knee, the apparatus should include, at the same time as the knee, the hip and the ankle.

In order to better immobilize the instep, the knee and the entire foot should be included.

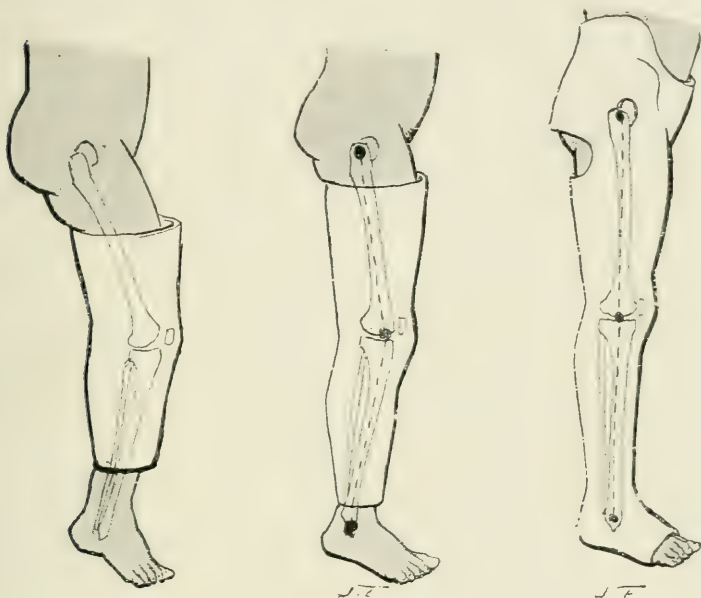


Fig. 43. — The short knee-piece too often made. Much too short and too large : the tissues are allowed to be depressed by the edges of the knee-piece and deviation is produced at will.

Fig. 44. — A longer knee-piece, but again insufficient for the same reasons.

Fig. 45. — The perfect method of immobilizing a knee. Our large plaster takes in, not only the knee, but also the two adjacent articulations.

If the plaster does not include the two neighbouring articulations, a deviation within the plaster, and in spite of it, will appear or reappear (fig. 43, 44, 45).

And even the formula that the two adjacent articulations should be included is insufficient in many cases; for example, in a coxitis during the acute stage, one should include below, not only the adjacent articulation (that is to say the knee), but even the entire foot.

which says that the two adjacent articulations must be included in the plaster was here adhered to : that formula is then insufficient in certain cases.

Still further : in affections of the spine, in an osteitis of the tenth dorsal vertebra for example, it would be altogether insufficient, and even ridiculous, to include in the apparatus only the two articulations next to the affected part. And for orthopedic affections of the back, whatever may be the seat, you must include in the apparatus, if not always the base of the cranium, at least the scapular and pelvic girdles (shoulder and pelvis).

We will mention elsewhere, in studying the different maladies, the dimensions to be given these apparatus, in each instance.

b) The plaster must be carefully moulded over the region.

It should be as exact as if it were applied to the skin itself. One might, strictly speaking, apply the plaster to the skin as is done in the attelles of Maisonneuve, in fractures of the legs. But the plaster adheres to the hair, its direct contact is disagreeable, especially if made with cold water, which is the rule, it might have grave inconveniences when it is a question of a thoracic plaster; its removal would be also more difficult. For all these reasons, and also to ensure the cleanliness and good condition of the skin, it is better to cover it with a soft tissue, — but with the proviso that nothing be omitted to ensure the accuracy of the apparatus, — a condition which is evidently not always fulfilled when, as is often done, coverings of cotton wool of several fingers in thickness are used.

It is impossible, with a plaster applied over such a thick cushion, to control with precision a fragment of bone which is pointing, spinous processes which project, lips of articulations which tend to be deviated. It is impossible, especially after some weeks, or may be months when the cotton wool has been crumpled, and that, always unevenly. This explains well how it is that plasters, applied to limbs straight or redressed, generally yield limbs or the trunk deformed (in Pott's disease, hip disease, or fractures).

What is to be done ?

When you **have only cotton wool** at your disposal, you may use it, provided that you apply only a *very thin layer*, as thin as possible, but uninterrupted: say, to fix your ideas, a layer of one and a half to two millimetres, spread out very evenly.

But, as you may guess, this is not to be done without difficulty; and it is for this reason that I advise you **never to make use of cotton wool except in case of necessity**, and to prefer the fourreau of soft tissue.

The fourreau you will find everywhere. It is for the leg (as for the upper limb) a jersey sleeve or two jersey sleeves placed end to

end; it is, failing a jersey sleeve, an ordinary sock for the leg and the foot: it is, for the trunk, an ordinary jersey, and for the large apparatus for the lower limb, still a jersey, but put on after the manner of a pair of drawers.

If the fabric of the fourreau is too thin, put on two¹.

So much for the covering of the skin. Now for the mode of applying the bandages.

I have said that *it is not sufficient to apply the strips exactly*, that it is *necessary moreover to mould the plaster around the projections of the region*; this moulding applies especially to *plasters of the pelvic region and the trunk* (we will return to this *a propos* of the apparatus for coxitis and Pott's disease).

I have spoken also of the necessity of **maintaining** the position of the limb **until the plaster has set**, but I wish to insist, because this rule is violated every day in the greatest part of surgical practice. Bring to your mind what often occurs: The "chief" refuses to remain any longer, judging that his importance calls him to more noble duties; he hands over the task of maintaining the position to an externe or, to an obliging friend who is not slow in losing his patience in his turn, in front of this plaster *which will not dry* (too often the plaster of hospitals refuses to dry, being decomposed), and he lets it go before it is "set": the correction is lost in parts or altogether and thus the final result is lost or compromised.

You should keep up the support right up to the setting which will only require a few minutes, if you have taken care to procure good plaster and tested it beforehand, every time you have to construct a new apparatus.

B. — HOW TO MAKE A PLASTER WHICH WILL NEITHER BE UNCOMFORTABLE NOR CAUSE INJURY.

And first, an *axiom*: *a good plaster must not cause discomfort.*

On the contrary, it should give a sense of security and of perfect comfort just, for example, as a well made boot. The patient ought to feel more easy with it than without it! This is true to the letter; children who are taken out of a good plaster are impatient to return to it.

1. The tissue of the Pyrenees and the lint recommended in some books are not sufficiently delicate.

But let there be no misunderstanding. It may be that when it is a question of a first plaster, the patient complains of slight discomfort during the first few days, without there being any bad workmanship of the plaster, without any other reason than that of being unaccustomed to it. Thus an adult on whom a large plaster is applied for



Fig. 46. — What is not to be done : do not pull on the bandage and cause œdema of the limb.

Pott's disease is liable to complain of a little discomfort during the first forty eight hours, even with a well made plaster.

In such a case one does not re-make the apparatus (nothing is to be gained by it). It is necessary only to help the patient with soothing draughts and a few kind words, to pass the first few rather unpleasant hours. — assuring him that to this discomfort will soon succeed perfect comfort¹.

And, even more, when the plaster has been applied for a *grave injury* or after the laborious or *painful correction* of some deformity, the patient may be expected to experience some pain during the first few

1. We will describe *à propos* of the plaster corset, the means of suppressing almost entirely this discomfort by making slight temporary modifications in the plaster.

days, without one necessarily inferring that the plaster is at fault. The pain will pass off gradually, whereas, *in a badly made plaster the pain would go on increasing.*

We will see first :

Why a plaster incommodes, injures, or causes troubles of nutrition.

It is first *because it is not accurate.* — *The first condition*

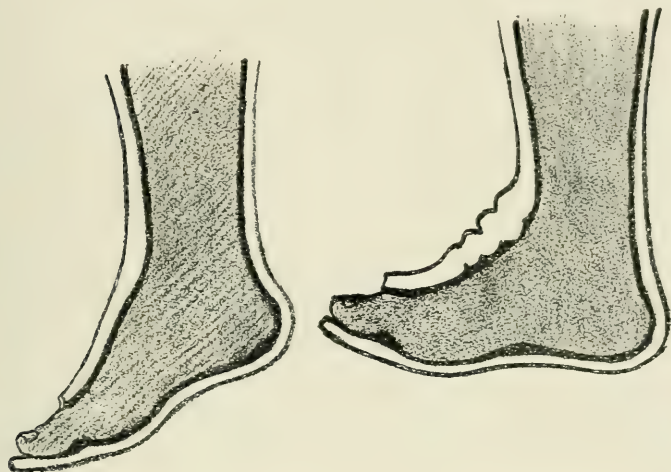


Fig. 47 and 48. — What it is not necessary to do. The foot is held in the position of equinus up to the moment of applying the plaster and it is not straightened until immediately afterwards (see explanation of following figure).

Fig. 48. — The foot plastered in extension (vide preceding figure) is carried immediately afterwards, before the plaster sets, to an angle of 90° ; creases are formed in front of this angle and will nearly certainly bring about a slough, or compromise a vessel.

which the plaster should fulfil in order to be tolerated. *is accuracy.* One might believe, at first, that a very accurate plaster would be a troublesome plaster: well, it is the contrary that is true: it is the very loose apparatus which brings about by its shaking, its incessant movement, a friction of the projecting parts of the plaster against the prominent parts of the body, which friction may possibly produce a slough.

While, with well modelled apparatus, the reliefs of the body are fitted immoveably into the depressions of the apparatus, and there are no scars, or practically none, to be afraid of. But, this need not

surprise you since everyone knows that a horse is injured, not by a tight collar, but by a loose one.

We have already mentioned the method of making well fitting plasters, we will not return to it.

Second, ***because it is too tight at one point, or all over.*** Like a well-made boot, a plaster can and should be *accurate without being tight*.

The principal cause of tightness in a plaster, is that the bandages *have been pulled upon too much* when applied. We have mentioned that it is a fault which beginners commit very often; they have a tendency to pull upon a plaster bandage as they pull upon an Esmarch



Fig. 49. — In case you should have committed the fault indicated in fig. 47 and 48, here is the way to remedy the formation of creases represented in fig. 48: you contrive a square opening in front over the ankle.

bandage. It is necessary then to guard against causing oedema of the limb. Do not think there is need to pull on the bandage in order to apply it exactly. No, it is sufficient to unroll it exactly over the circumference of the limb, as if one had to take an impression of its contour, as it were, without subtracting anything, without adding anything. Therefore do not pull upon the bandages.

But there are other reasons for the plaster being too tight.

1° Because the **assistant** who held the foot **has drawn** or **pressed strongly** upon the apparatus, before the plaster was set. It seems hardly possible to avoid these tractions or vigorous pressures, when the foot itself has a tendency to deviate.

One can do it however, by making it an absolute rule to correct all somewhat obstinate deformities before applying the plaster, and not to add in any way to this correction afterwards.

2° For deformities of the foot, if one tried, after having constructed the plaster on the foot in extension, to roughly flex the foot upon the leg (fig. 47 & 48) a buttress would be produced in front, a plaster ridge, capable of producing a blister, or even of arresting the circula-

tion in the foot. It would suffice it is true, to prevent all annoyance, to make an opening in the apparatus in front, in order to remove this pressure of the plaster (fig. 49).

Another precaution : the assistant **will change places with his hands** from time to time, change his hold, whilst the plaster is drying : a continuous and prolonged pressure at the same point may make a depression in the plaster.

Lastly, if, in spite of everything, there remains on the surface of the plaster flattened or deep impressions (fig. 50), caused by the



Fig. 50 — During the drying of the plaster depressions may be produced by the side of the table upon which the patient has been lying, or by the hands which have been supporting the correction. Here is a specimen of such depressions.

application of the hands, one will make, immediately after the setting, openings at these points, replacing afterwards the pieces removed by squares of plastered pads, or by some turns of plastered bandages (fig. 51).

This is how you can always, or nearly always, prevent the plaster from being troublesome. I say nearly always, for there are **exceptional cases** where a **plaster**, however well made, **may** cramp or **wound** the patient, owing to the nature of the lesions or to his generally bad condition.

1st. **Because of the lesion** : for example, a pointed gibbosity or a fragment unusually prominent in some fracture of the tibia or of the clavicle may have ulcerated the skin without any fault having been committed in the making of the plaster.

But, one can always, or nearly always save the integument, even in that case, if one takes care to make an opening in the plaster immediately after its completion.

2. **Because of the subject;** for example, in some paralysed subjects, the simple weight of the limb may, strictly speaking, cause a slough in the sloping parts, and the mere weight of the plaster produce a slough in front.

And you may see that also, though in a less degree, in very cachectic subjects.

Finally, we must say that we may meet with intolerant skins.



Fig. 51. — One raises, as shewn here, or better still one picks out the parts crushed in and at once closes the openings by means of square plasters, or a few turns of plastered strips.

bearing contact with plaster badly, becoming immediately eczematous. But, let us assure you, that this is met with, hardly, once in a hundred cases.

The Method of treating wounds or trouble with nutrition of the skin.

In pointing out the causes of these troubles we have indicated at the same time the means of *guarding against them*, that is to say, their *preventive treatment*.

If these troubles do arise, this is the method of remedying them :

First case. — There are **troubles with the circulation** and **the innervation** of the limb.

These troubles are easily detected; it is sufficient to examine the

toes and that is what one should always think of when a plaster is just finished.



Fig. 52. — This plaster was too tight in its whole extent; it has been split from top to bottom and the edges separated.

These troubles are due to the fact that the plaster is too tight everywhere.



Fig. 53. — This plaster was too large; a tongue shaped portion has been removed in the median line.

In order to relieve the constriction, it is not necessary to remove the apparatus, it is sufficient to loosen it by simply splitting it in the

median anterior line, in the manner mentioned on page 41 and fig. 52.

When this anterior incision of the plaster and the consequent separation of the two lips have not entirely put matters right, not bringing back, for instance, the return of *sensibility*, as well below the toes (or fingers), as above, you should open the apparatus behind and better still, *remove it completely* and change it, guarding this time against the fault committed before (of applying the strips too tightly)



Fig. 54 — The median tongue has been taken out, the plaster is then readjusted by bringing together the sides which are maintained in contact by turns of plastered strips.

But, once again, if you are careful never to leave your patients who have had apparatus fitted, without satisfying yourself that the *nutrition* of the toes and fingers is normal, or is *becoming normal* again, you will never have any serious trouble.

We will allude, in passing, to the case of the **plaster which is too loose.**

This arises, as we have said, through the strips not having been exactly applied¹.

1. Except however, in the case of fractures with swelling of the limb In that case a plaster fitting on the first day, will not do so a week or two afterwards (v. p. 82).

Can it be remedied? Yes, in the following manner.

The manner of readjusting a plaster which is too large.

You make an incision along the middle line in front, cutting out from one side, or from both, from top to bottom, a strip of plaster, one, two, or three centimetres wide; after that you bring together the sides and fix them with a square of plastered muslin, encroaching on

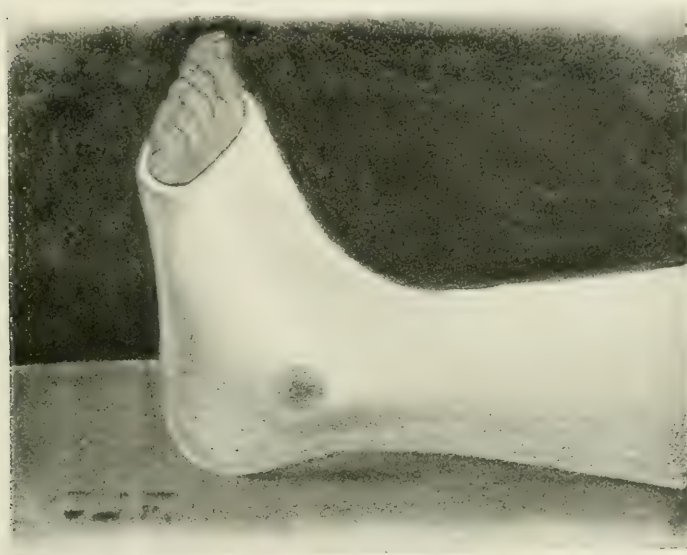


Fig. 55. — A stain produced by a slough ; this stain is tinted more deeply at the centre than at the periphery; it is not got rid of by scraping the surface of the plaster; on the contrary, it becomes more evident the more deeply the knife sinks into it.

the two edges, or else with some turns of bandage (fig. 53 and 54).

But, in this case, it is still more simple and more perfect to replace the apparatus altogether. You should replace it in the case of a fracture, after the swelling of the limb has disappeared.

Second case. — There exist pain, excoriations, or sloughs.

Here the patient complains, one or several days after the construction of the plaster; he indicates *a pain at a particular point*; at the heel, the malleoli, or the knee. We have said that this ought not to be, that it was not in the programme. It behoves you to seek for the cause by *making an opening* in the plaster, at this point.

The skin being laid bare;

1st. One finds *nothing abnormal*, or, simply that the skin is *slightly reddened*. In both cases, you powder with talc, and close the opening with a square of cotton wool and a few turns of soft bandage, taking care to inspect it again if the patient complains.

2. There is already a *small slough*.

Sloughs are exceedingly rare, if you have² made no mistake in

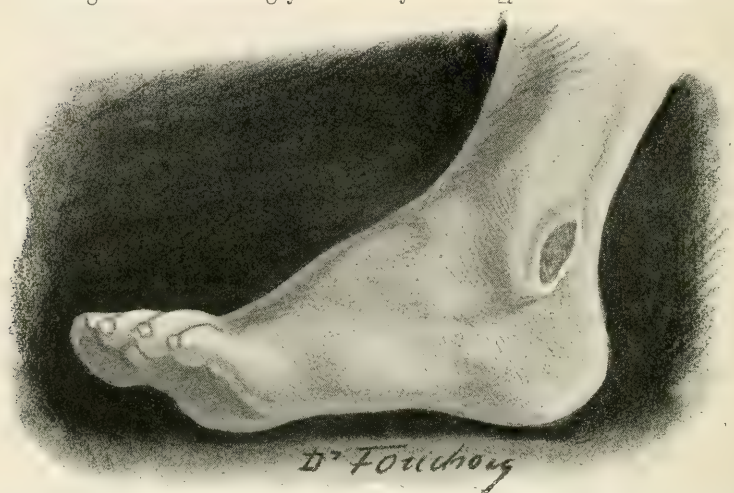


Fig. 56. — The first kind of slough; that which excavates, that which destroys. It is seen especially in cachectic subjects. This variety is less benign than the following one (fig. 57).

Its treatment : To stimulate by the application of tincture of iodine, of Vigo plaster, etc., the vitality of the mortified tissues.

the technique. Nevertheless, they may be produced quite apart from any fault in technique, as we have said, in cachectic subjects. They may even be produced at any time, by the penetration, beneath the plaster, of a foreign body, small particles of plaster or of sand, various articles introduced by the patients themselves, buttons, medals, coins, hooks, pencils, etc., or even by the repeated soiling of the skin, with urine, pus, etc.

How to discover the slough.

One is warned by four signs, which are, in ascending order of frequency; *a*) a slight elevation of temperature; *b*) a localised pain; *c*) a staining apparent on the surface of the plaster; *d*) a disagreeable odour emanating from the plaster.

a. Sometimes, though very rarely, it is announced by a slight rise of temperature.

If, in a plastered subject who has had no rise of temperature before the application of the plaster and has not been redressed nor sustained any serious accident, there occurs a slight evening fever of



Fig. 57

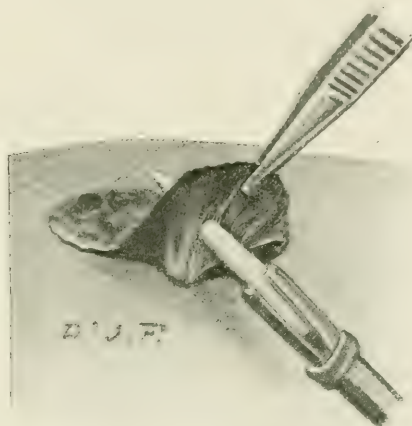


Fig. 58

Fig. 57. — The second kind of slough: that which fungates (cauliflower). In the preceding, there was mortification of the tissues, here there is over-production. This second variety is very benign. — One finds it especially in subjects of good general nutrition. — Treatment: Get rid of the exuberant tissue by cauterizations of nitrate of silver or the thermo-cautery.

Fig. 58. — The second variety of slough (fungating), a stage further advanced. It shows itself in the form of a “mushroom” or of “cock’s-comb”; sometimes very large with a delicate pedicle. One cuts this pedicle with scissors, or destroys it with a pencil of nitrate of silver, as in this figure.

38° to 38,5° after one, two or three weeks, one ought to think of the possibility of a slough having formed.

Look immediately and see if you can find a disagreeable odour from any part of the plaster; if you do, make an opening at that point. If you do not, and in case of doubt, — after having waited eight or fifteen days at the most — cut the plaster in two halves, in order to make a complete examination of the region.

And you would do the same, if after having found a slough and having dressed it through a small opening, you find fever persisting which is not explained by the said slough: in that case, cut the plaster in two halves, to assure yourself there is no slough elsewhere.

b. Pretty often, it is the pain persisting at one point, always the same one, (over a malleolus, the heel, the iliac spines, the sacrum, the knee) which discloses the slough.

At the seat of the pain, you make an opening in the plaster.

c. **More often** still, you are attracted by the appearance of a **brown stain** on the surface of the plaster. Do not confuse this with the staining produced by urine, which gives the odour of urine and not of pus; it is rather yellowish and disappears on scraping the surface of the plaster, whereas the discoloration produced by sloughing persists in spite of scraping (fig. 55).

d. But the **most characteristic sign** of sloughing, is the disagreeable odour emitted by the plaster at one point; it is a special odour comparable to the odour of pieces of old dressing impregnated with pus¹, an odour which makes itself apparent if one puts one's nose near the apparatus.

I have an attendant who passes his nose from time to time over the apparatus and quickly ferrets out, even a commencing slough, to a certainty.

Here, **smelling is better than seeing**.

How to treat a slough (fig. 56, 57 & 58).

It is not necessary to remove the apparatus, it is sufficient to *make an opening*,² at the place indicated by the discoloration of the plaster or by the characteristic odour. The slough being exposed and uncovered for three or four centimetres from the edges of the opening of the plaster, you cleanse it, rub over with nitrate of silver the fungating wound, and then treat it with a layer of powdered talc, or with vaseline sterilized, or with naphthalan pommade. You dress it every day until it cicatrizes, which it does very quickly (in 6, 8 or 10 days).

1. And yet, this very disagreeable odour does not signify, absolutely, the existence of a slough; **the most disagreeable odours** are due to a **discharging eczema** more often perhaps, than to a real slough. But, in both cases, it is necessary to examine and treat the skin. You treat these eczemas with sterilized talc (rather than with vaseline), or, with daily applications of a layer a millimetre thick, of a black pommade known as naphthalan, and better still, by radiotherapy, or exposure to open air or the sun.

2. In the exceptional case of multiple sloughs, one turns the plaster into a bivalve, which allows one to make the dressing without neglecting the support of the limb.

Given these indications, you should know how to avoid sloughs, or, if in spite of everything, they occur, to recognise them quickly and cure them very easily, — in this way a slough ought to be a negligible incident.

Another incident possible after the application of a plaster (and which I wish to point out, being desirous of omitting nothing which may be useful to you); when you have stopped applying a plaster of the lower limb (or of the upper) for a more or less considerable dis-

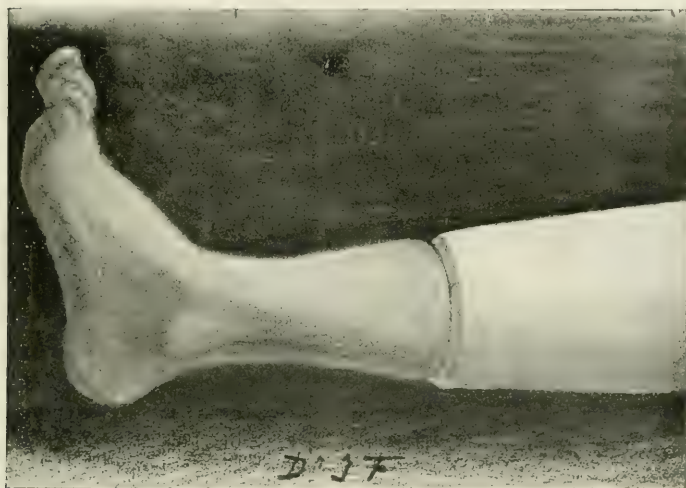


Fig. 59. — A plaster which does not reach to the extremity of the limb; it has produced a swelling of the free part.

tance from the toes (or fingers) you may possibly see a *swelling* of the free extremity of the limb (fig. 59).

What is to be done in that case? Invariably the parents propose to you to pare down a little of the lower border of the plaster. But if you cut it (or pare it) you will find the swelling will appear higher up. Instead of cutting the apparatus, as the parents request you to do, it would be better to lengthen it; instead of freeing the limb, it would be better to bandage the free portion, and that is indeed what you will do (fig. 60).

You will apply, then, over the swollen part of the limb, a cotton wool dressing; gently introduce a little of this cotton wool (a layer 2 or 3 millimetres thick) between the lower border of the plaster and

the skin, and you will afterwards enclose this wool dressing with a soft muslin bandage, or better, with one of Velpeau bandage, going methodically from the extremity of the limb up to the plaster, and overlapping that with one or two turns of bandage.

You bandage the leg in the same way from the toes up to the knee, if it is a question of a swelling of the leg or foot, due to an apparatus stopping at the knee.

It is the same for the upper limb.



Fig. 60. — In the case of swelling of the free part of the limb, do not pare round the lower border of the plaster, but make a slit longitudinally, following the axis of the limb to the extent of 3 or 4 centimetres, then raise gently the edge of the apparatus in order to pass between it and the skin, a layer of wool; afterwards compress a little the free part of the limb with a Velpeau bandage, commencing at the toes and rising up to the border of the plaster.

Look at it the same evening or the next day and you will see that the swelling has already almost completely disappeared; re-apply the same compressive wool bandage, and renew it every two or three days, until the tendency to swell no longer exists.

If it persist, provided it is only a slight degree of swelling, no inconvenience will be caused by continuing this slightly compressive treatment.

But, if the tendency is too marked and persists beyond fifteen days, you slacken the plaster by splitting it from top to bottom; you afterwards separate the two edges by 2 or 3 centimetres and keep up this separation after the manner described at p. 68, in the case of a plaster which is too tight.

Finally, one last remark; *when an opening is made in the plaster, it must always be closed*, otherwise the skin would be cut against the sides of the openings. You reclose it by applying over the exposed part, squares of wool the sides of which are lightly packed between the edges of the plaster and the skin, and kept in position by several turns of soft bandage exerting a certain amount of compression. (V. p. 50).

Is there no formal contra-indication against the employment of Plaster. For example, the age of the subject? No : it is possible to plaster the very young (for example for club-foot) as, also, very aged persons (for example, for a fracture).

Simply, it will be necessary, in those as in the paralysed and cachectic, to make an inspection nearly every day, inspecting the nutrition of the toes (or the fingers) by which means you will avoid any disagreeable surprise.

In small children, because of the frequent soiling of the plaster, it would perhaps be advisable to change the apparatus rather more often — it is only a little inconvenient after all.

Resumé and Conclusions.

You see that I have not hidden from you any of the incidents or accidents possible after the construction of a plaster. I have done so to give you the possibility and facility of being on your guard. But, I should have failed in my object and I should have misrepresented things if I had left you with the impression that it is a “horribly difficult” thing to succeed with a good plaster, and that with the presence of so many pitfalls to avoid, with so many dangerous headlands to double, it would be better not to venture with it. Such a conclusion would be in reality a complete error, very prejudicial to your patient and yourself so that it is my duty to dissipate it.

No : to sum up everything, when you have a plaster to make, spread your bandages **accurately**, but **without pressure or traction**; *mould* the plaster afterwards by pressing it **around the prominences** and not over them; **correct** bad positions **before** applying the plaster; **maintain** this correction without **altering it**; **make an opening** in the plaster immediately after it is set if it appears to be too depressed at any point; **split** it from top to bottom, if you consider, from the condition of the toes, that it is too tight in its entire length.

All this is sufficient — and there is no “sorcery” in it — to avoid all accidents, or, at least, all serious accidents.

C. — HOW TO MAKE ELEGANT PLASTERS

The ideal as we have said, is to make plasters not only comfortable and accurate, but even elegant; to unite to the *tuto* the *jucunde*.

Besides, the two things go nearly always together. An accurate plaster could not be ugly, because it reproduces the form of the human body. But if, in addition to this **regularity** you give to the surface a **polish** and a **brilliancy**, then it will be perfect.



Fig. 61. — The apparatus in the rough before polishing.

And do not think that this prepossession for making elegant plasters is of no importance in practice; on the contrary, it is by this that the relatives judge you most often!

And by what you would expect them to judge you, before a definite result has been obtained, which may require several months, or even years? By what, if not on comfort (or discomfort) due to the apparatus, and by the elegance (or the ugliness) of that apparatus? Therefore, train yourself and spare no trouble to make elegant plasters.

In place of a clumsy piece of work, strive to make what I may call

a work of art. You will be able to do it if you set your mind on it¹.

In order to produce an elegant plaster, one polishes it.

The polishing of the plaster.

There are **two processes**; first, **immediate polishing**, done as soon as you have rolled the last plastered strip, before the plaster sets.

The second, **late polishing**, done *when the plaster is dry*, that is to say two or three days after its construction.

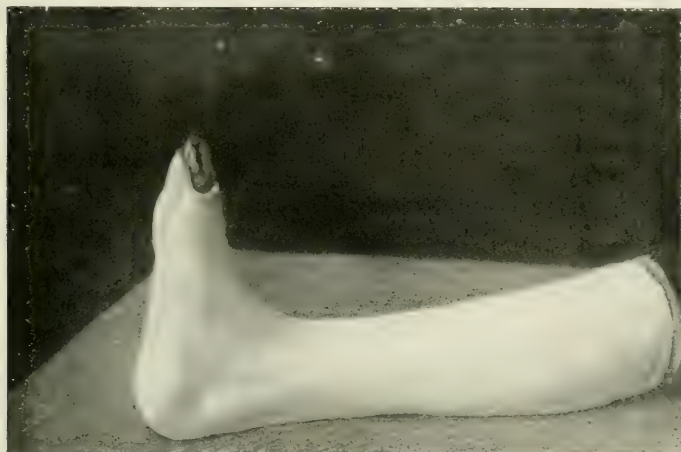


Fig. 62. — The plaster apparatus polished. The polishing has had the effect of effacing the external roughness and rendering the apparatus smoother and more glossy.

The first process, the most convenient, the most rapid, has not the same aesthetic value as the second but it is nevertheless sufficient, and it is that which I advise you to use in practice, because the other demands much time and experience. In our practice, it is nearly always the second which is employed, it is true, but only because our assistants or attendants relieve us of this care; and if you have in the same way anyone whom you could train once for all, use the

1. It is done, for example (one may say it I think, without preemption), by all the doctors at Berck, who, it is true, place in it their *amour-propre* and pride themselves in making good plasters. And they themselves profit by it, as one of the factors of the apparatus. The plasters of Berck are known far and wide. And even at Paris it is admitted, that where plasters are concerned, the apparatus of Berck rank as high as those of Paris.

second method : if not, reserve it for special occasions, « *ad usum Delphini* », for a case where you are decided neither to save time, nor trouble, to arrive at the most beautiful result possible. In all the other cases, you will keep to the method which follows.

Immediate polishing.

There are several methods of performing this immediate polishing.



Fig. 63. — Immediate polishing, to be done after having rolled the last strip and applied the last layer of cream. The way of doing it; over the apparatus, a large square of plastered muslin is applied, which is closely flattened and any creases reduced by pulling firmly on the sides which are crossed over each other behind.

This is, after having tried all, that which I have found the most simple, the most practicable and the best for you ; it is to cover the whole surface of the apparatus with a sheet of plastered muslin.

After the application of the last strip and of the last layer of plaster, you cut a large square of muslin of a single thickness, making it of the same length as the apparatus and of a breadth a few centimetres more than the greatest circumference of the limb. You soak it in what remains of the plaster, or in a new mixture; you smooth afterwards with the flat of your hands the two faces of this square, well spread out, after which, you will apply it immediately over the apparatus, beginning by adjusting the centre of the square along the

median line of the anterior surface of the apparatus, flattening it down afterwards and laying the two flaps of this "outer casing" upon the side of the plaster, up to the middle line behind, where you cross the superfluous portions of the lateral flaps over one another. The edge overlaps more or less according as the limb is more or less thin; where the overlapping is excessive, where you have too much material, for example, at the instep, cut off the exuberant portions with the scissors: take care to allow a few centimetres for the two flaps to unite the one with the other.

It is all the better to apply the middle of the attelle in front, in order that the edges may be thrown behind, where they are not seen (no little detail should be disregarded, seeing that we wish to have the apparatus as neat as possible).

The application of this supplementary sheet of plastered muslin, serves, among other things, to strengthen the plaster¹.

Subsequent Polishing of the Plaster.

This polishing is done about 48 hours after the plaster has been constructed, when it is dry. You commence by softening the outer plaster glazing with thin paste; one, or one and a quarter, cup of water to one cup of plaster of Paris. You pass the hand over the whole surface of the plaster, or you may use a tampon soaked in this watery paste.

After two or three minutes, a softening is produced; take advantage of this for levelling, with a knife, the surface of the plaster, clearing away all the angles and ridges, after which, over this carefully levelled surface, you spread a coating or glaze of thicker plaster, made with two cups of plaster of Paris to one cup of water.

The best manner of proceeding is: — put half a cup of water into a basin slightly inclined (at an angle of 30°), then, in the upper part untouched by the water, put in reserve a cup full of plaster of Paris. Keeping the basin inclined, take a pinch of plaster between the thumb and fingers, dip the finger ends into the water withdrawing them immediately, still holding the pinch of plaster which has now become a paste. This is spread over a small part of the surface

1. Keep to this method, and I dissuade you from polishing by pasting on the apparatus two great placards of dry muslin (not soaked in plaster); it is a dangerous procedure for you; it hastens the setting of the plaster and, for that very reason would not allow you time for making a good modelling. — to say nothing of the fact that this procedure in "quickenings" the setting of the plaster, deprives it in the end of its firmness.

of the apparatus, in a layer of about a millimetre in thickness; afterwards smooth over this surface with the hand or with a tampon soaked in the water which you find in the tilted part of the basin. Then, take another pinch of plaster which you moisten in the same way, and cover another portion; smooth it down equally and so on, until the whole of the apparatus has been polished.

You get in this way a glossy apparatus, and the plaster after a few months, comes to resemble very fine old ivory.

We have often been asked for the secret of the composition of the polish employed in obtaining the beautiful plasters of Berck. You see, there is no secret, no mystery; the polish is simply a layer of plaster paste, with which — if one has a little practice and some dexterity — one can make the most beautiful plaster apparatus in the world!

We may add that it is easy, when the plaster is soiled, to recover its whiteness. This can be done by passing over the surface a tampon soaked with very thin plaster (equal parts of plaster of Paris and water).

A FEW WORDS ON THE USE OF PLASTER IN THE TREATMENT OF FRACTURES

First. You should **apply your plaster immediately**, as soon as you see the patient, **without delay**, even in the case where the limb is swollen; all you have to do when the swelling has diasp-

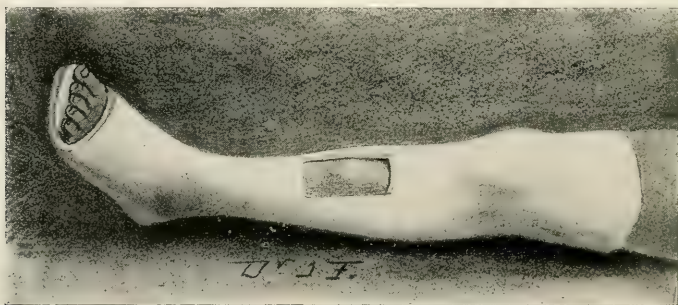


Fig. 64. — Fracture of tibia with projecting fragments; on a level with the fracture an opening is made in the plaster to compress the fragments (with squares of wad and kept in position by a bandage).

peared, after ten or twelve days, is to replace the first plaster by a second one more accurate¹.

Secondly. You must treat all your fractures, not with box splints



Fig. 65. — Fracture of clavicle with displacement. One compresses the projecting fragments through an opening in the plaster.

1. If, after the twelfth or fifteenth day, the plaster seems slightly slack there is no need to change it; tighten it by cutting off a strip from the anterior face of the apparatus as described on p. 70.

but with **circular plasters**, for the reasons you already understand, that with a circular plaster, the patient will be at once *more comfortable* and *better supported*; you will obtain the most perfect results.



Fig. 66. — Radiogram; fracture of femur at the lower third; angular displacement and slight overlapping of the fragments.



Fig. 67. — Reduction of the fracture has been effected under anæsthesia; radiogram taken through an opening in the plaster apparatus: the displacement remains as before in spite of very powerful traction exerted on the foot.

By constructing the circular plaster in the manner explained, by inspecting afterwards the condition of the fingers and toes, you have *no need to fear* for the good nutrition of the plastered limb.

a What should be done in the case of a fracture **complicated with a wound**;

Make an **opening** in the plaster (a few hours after its construction) through which to dress the wounds,

If there are **several wounds** you can resort to the construction of a **bivalve plaster**.

b In the case of a **projecting fragment**, for example in fracture of the tibia or clavicle.

Exert **pressure** on the fragments of the tibia, or of the clavicle, **with squares of wadding** held by strips of adhesive plaster. You exert pressure in a manner similar to that of compression of a Potts' gibbosity (v. ch. V).

In the case of fracture, the pressure should be made less over the summit of the projection than upon the adjacent parts of the bony fragments.

Fracture of the Patella. —

Treat in the same way, by compression. Arrange strips of cotton wool around the two segments of the patella. Proceed in a similar manner in fractures of the **olecranon**.

Fracture of the Femur. —

Here again, we make, rather than the generally extolled extension, a large plaster, because with an accurate plaster we obtain results far superior to those formerly obtained by Hennequin's extension.

This plaster should be very carefully moulded on the pelvis; before setting, one pushes against the ischium from below upwards, while vigorous traction is made on the foot. By making an opening in the plaster it is possible to perfect the correction in the way

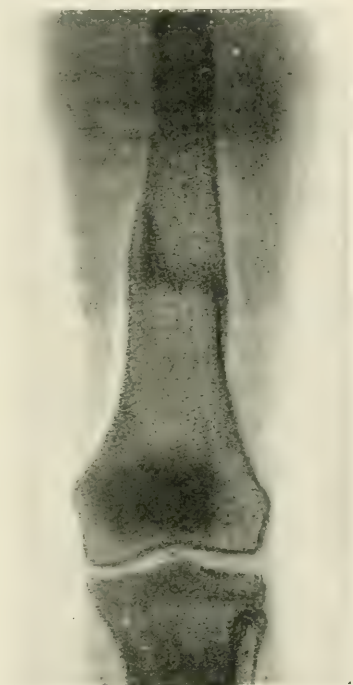


Fig. 68 — In this plaster an anterior opening has been made opposite the fracture; this arrangement has allowed of a progressive reduction of the displacement being effected. For some consecutive days, this progressive reduction was carried on by compresses of wadding, inwards on the upper fragment, and outwards on the lower fragment and renewed every three or four days. This radiogram was taken after the removal of the plaster, six weeks after the accident. Compare with it fig. 66 and 67, it can be seen that the result obtained is perfect.

here represented. Here, for example (fig. 67 et 68) is a case of fracture of the lower third of the thigh, where the radiogram shows projection of fragments which immediate reduction, made under chloroform, was not able entirely to efface.

We made an opening in the plaster at that point and applied the pads of wadding, above and outwards at one part, below and inwards at the other, consequently in opposite directions, to return little by little the two fragments into line.

This very energetic compression, was kept up by strips of adhesive plaster, and renewed every three or four days.

One can see, by comparison of the radiograms (fig. 66, 67 & 68), all the steps of the correction, and the perfection of the result ultimately obtained by this method, so simple and benign. Is there another method (surgical operation or extension) which would give, I do not say a better, but as good a result? We do not believe it.

For fractures of the arm or fore-arm one should be guided by the same principles.

II

REMOVABLE APPLIANCES AND ORTHOPEDIC APPARATUS¹

Precious as plaster apparatus are, they do not suffice for all our needs. We shall see this in studying each deformity.

But, by this time you will have found out that for many patients the *plaster apparatus* may be contra-indicated, because it is *not movable*, nor *articulated*; and that in some other cases, it will be rejected simply because "it is plaster".

I will explain myself :

First. In certain diseases, the patients require to be supported by an apparatus, but with **the possibility of its being taken off** from time to time, in order to follow some physio-therapeutic treatment : massage, gymnastics, bathing, electricity, etc.

Example : the scoliotics (and you know they are legion).

Example : patients afflicted with infantile paralysis.

1. See, on this subject, the admirable thesis by our assistant at Berck, Dr. J. Fouchet.

For some of these, an apparatus may be indispensable, for ten or twenty years, and sometimes for life. It cannot be a plaster, but, some light apparatus, removable and jointed.

Secondly. There are other diseases where the treatment commences with plaster and is terminated with *removable apparatus*.

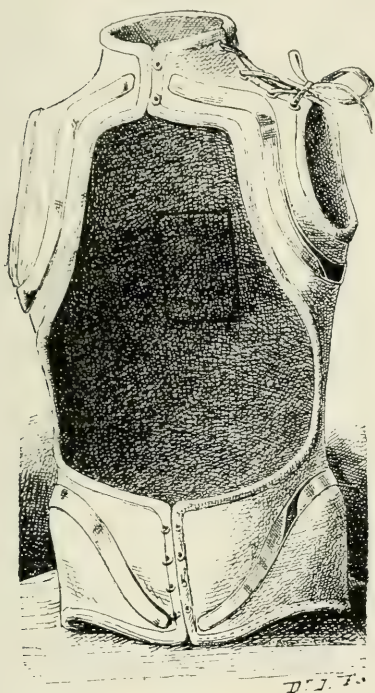


Fig. 69. — Celluloid orthopedic corset, with armature.

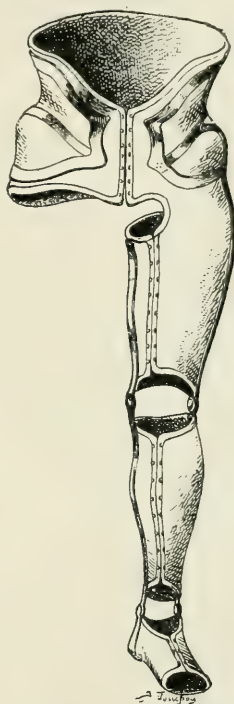


Fig. 70. — A large orthopedic apparatus in celluloid. — For the hip and entire lower limb.

Example : tuberculous orthopedic affections (Pott's disease, hip disease, white swelling).

The plaster is worn up to the period of convalescence; but, at this moment, when the patients are allowed to stand, it is advantageous to replace the plaster by a removable apparatus, which fills in the period between that of strict immobility and that of entire liberty.

By taking off the apparatus each night, and even for a little while

each day, the muscles are exercised and strengthened, the joints are loosened, gently and spontaneously.

There are other deformities (such as congenital club-foot, genu valgum, tarsalgia) where plaster is indicated immediately after the correction, in order to maintain it completely.

But, after some weeks or even months, the correction ought to be preserved by a lighter apparatus, which may be taken off at will, in order to safe-guard the nutrition of the muscles and the play of the joints.

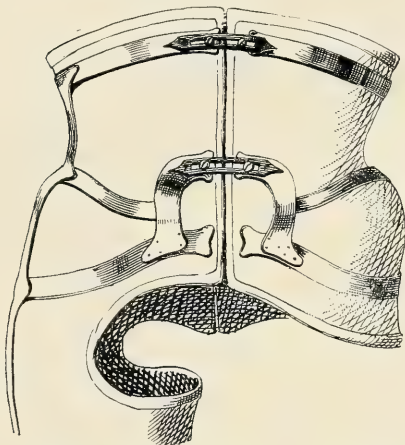


Fig. 71. — Dorsal aspect of the apparatus shewn in fig. 70. The two halves of the pelvic portion are joined behind by two sliding pieces allowing of the increase of the diameter of the girdle.

Thirdly. You will find many patients, especially among the upper classes, who ought to wear a plaster, but who will not have it at any price, not for a moment.

And why? Simply because *it is a plaster*, and because they are frightened or rather humiliated, by the prospect of seeing their children immured for months, perhaps for years, in a “block of masonry”.

A leg plaster, that may pass; but to be imprisoned in a great “pillory” of plaster which takes in the trunk entirely and even also, the head, that, never!

What is to be done? give it up? No. One can still at the last extremity treat them and cure them without plaster, by means of movable apparatus — although it involves a little more trouble and more time.

Ah! An apparatus which you can remove when you wish to, that, yes, they will agree to that, or at least, they will consent to try it, inasmuch as celluloid is a more appreciated article than plaster, with its bad reputation.

They will try the celluloid, and, what will happen? Very soon — having become accustomed to it — the patients, instead of being tortured, find themselves much better with the apparatus than without it, they no longer wish it to be removed, they cannot do without it, so that this removable apparatus becomes, as a matter of

fact, irremovable; and so it goes on to the cure: but there was a

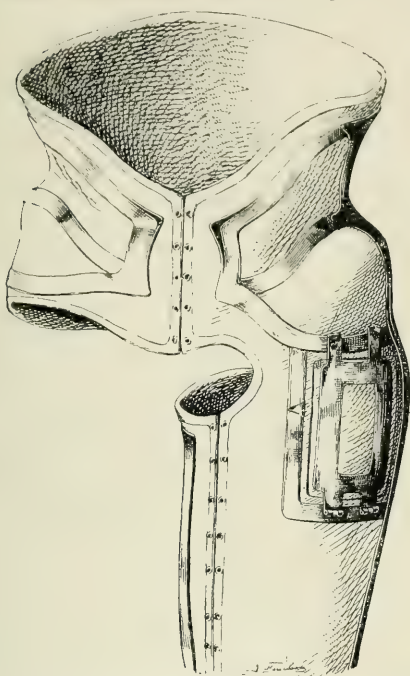


Fig. 72. — The same apparatus with a window-shutter opening allowing inspection of an abscess.

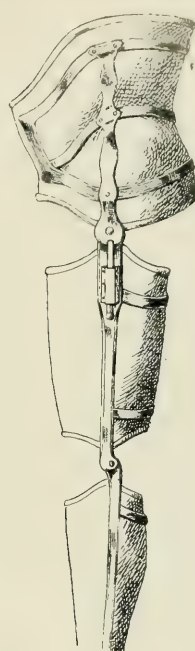


Fig. 74. — An articulated apparatus in celluloid for the hip. A bolt allows the joint to be fixed or loosened as may be desired.

right way to render an apparatus acceptable and this was, that it should not be a plaster one.

You see already how numerous are the indications for removable apparatus. Here are still more.

a. You are consulted by a man of very active habits, suffering with

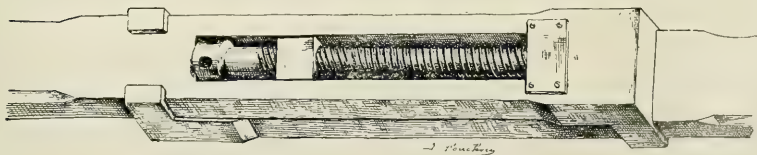


Fig. 73. — Thanks to this broadpitch screw adapted to the femoral part of the same apparatus, it is possible to produce a certain amount of traction on the limb.

Pott's disease; he will not comprehend that he ought to keep at rest in a large plaster, or rather, cannot, he says, having a family dependent upon him. He asks for a movable corset which will admit of his getting about and seeing after his affairs.

b. Several times, I have seen these patients with Pott's disease "broken-winded" and bronchitic, asking for a support which would accomodate the thoracic movements. I have sometimes supplied, with this object, a plaster, with a very large opening. but they prefer a moveable corset. Also, through especial anxiety to ensure the frequent toilet of the skin, many ladies of fashion prefer celluloid to plaster, etc.

So that, although plaster is always sufficient for the treatment of fractures,

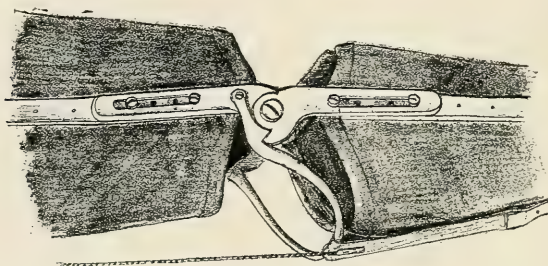


Fig. 75. — The bolt which fixes the knee-joint in extension for walking and which the patient can draw and unhinge, by means of a cord, in order to bend the knee-joint when he wishes to sit down.

it may not be possible, in the treatment of orthopedic affections, to ignore movable apparatus.

You will object that there are many patients unable to meet the expense of a removable apparatus, or to procure the help of the "assistance publique", still very defective in our country districts.

What can be done for these patients?

One thing only (not sufficient for all cases, but for most of them).

That will be, whenever possible, to finish the treatment with a plaster as in the case of treatment of fractures.

Come to the worst, it can be done for all deviations other than infantile paralysis (and it can be done even in certain cases of infantile paralysis).

It can be done in cases of hip disease, white swelling, Pott's disease; the patient will be allowed to stand and take his first steps still wearing his plaster apparatus. But we will return to this subject further on, *à propos* of these different diseases.

WHAT WILL BE THE MOVABLE APPARATUS?

1. Removable apparatus in plaster.

. Why not make movable apparatus in plaster, which will have

the advantage of cheapness and of being constructed by yourselves?
Because they are **heavy** and **fragile**, and not capable of being

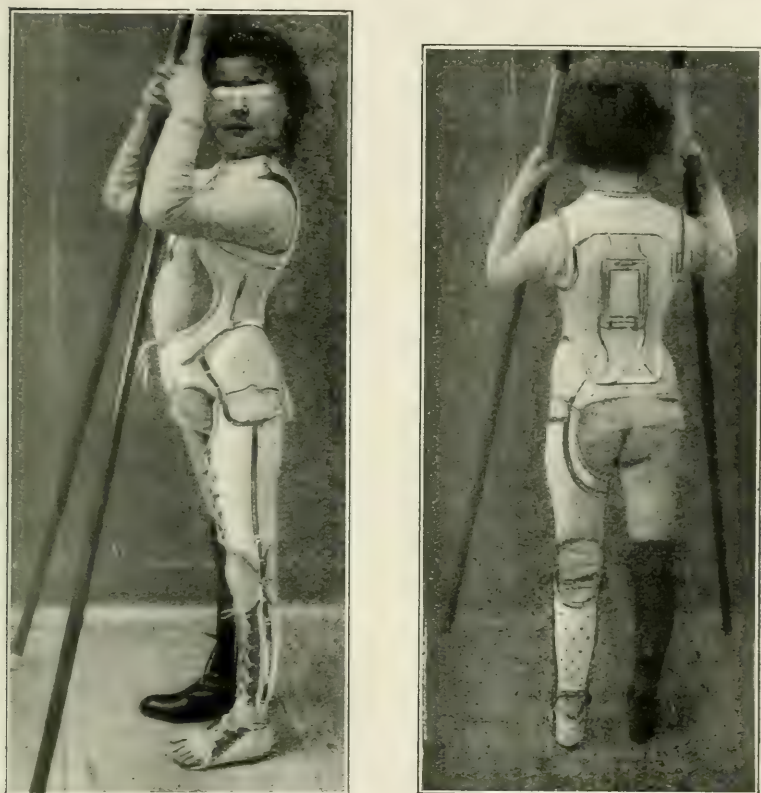


Fig. 76 and 77. — A celluloid apparatus embracing the trunk and lower limb for co-existent Pott's disease and coxitis. The limb portion may be separated, when desired, from the trunk portion, which thus becomes an ordinary corset.

articulated. Therefore, I do not advise you to make use of them in a general way.

Indeed, either the parents are able to meet the expense of the celluloid apparatus (which is much better than the moveable plaster), or they are not; then, it is much better to conduct the treatment to the end with immovable plaster, more simple to make and more effective than movable ones.

There remains however cases where a movable plaster is indicated. We will point out all those different cases, as we go along, *à propos* of each disease. But we may say, for the present, that one uses the movable plaster in all cases of multiple fistulæ, or where the skin is very irritable¹ and eczematous, requiring daily dressing, or still more in a breathless or very nervous subject, who wishes to

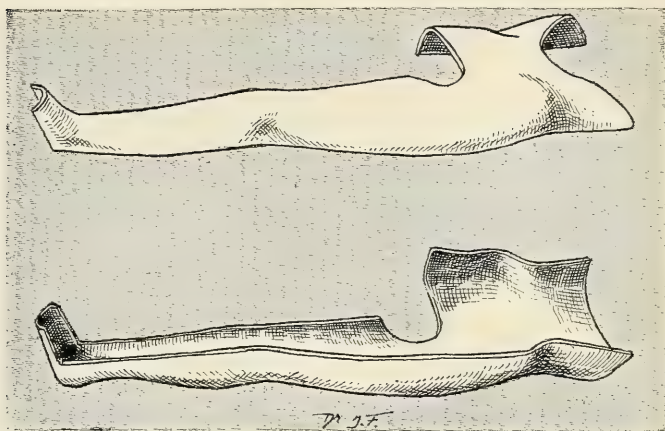


Fig. 78. — A large bivalve plaster for the lower limb.
The two valves will be kept in position by bandages or by straps.

train himself to wear his plaster, by keeping it on, at the beginning, only a few hours daily.

Movable plasters are useful again in *certain white swellings* (of the elbow, the wrist or the ankle) *during the period of injections*.

To be effective and durable, the movable plaster should be bivalve.

But it is not possible to make it of a single piece, that is to say, opening only in front, as in a celluloid apparatus. Plaster is not a sufficiently elastic material for that; made in one piece only, it will crack inside and lose its form almost immediately, after having been taken off and replaced scarcely four or five times.

1. In these two cases, the apparatus will be rapidly soiled and should be renewed very often. It will therefore be much more practical here to use movable plasters than celluloid, the frequent renewal of which would become far too expensive.

The Bivalve Movable Plaster.

Method of its construction.

It is sufficient to prepare an ordinary plaster in the manner already explained; and, when it is dry, after a few hours, or better still after a few days, it is divided into two valves, by symmetrical incisions at the sides, or before and behind.

To obviate the risk of damaging the skin in dividing the plaster, you should use two jerseys — or better, over a single jersey, corresponding with two lines already marked out for two incisions, place bands of wadding three or four centimetres wide and half a centimetre in thickness — or better still, two strips of zinc, such as one uses in moulding (v. p. 99).

The jersey, which remains attached to the inner surface of the apparatus, serves as a natural lining.

It is easy, afterwards, to reapply such a movable plaster.

The two halves are replaced in contact by their edges, and kept so by means of straps or a few turns of Velpeau (if one has to take it off every day), and strips of sticking plaster, (if taken off only now and then); or again, one may lace it with hooks stitched to the strips of linen (fig. 79) which have been fixed to the edges of the apparatus with plaster paste, or white silicate of potash, or even with ordinary glue.

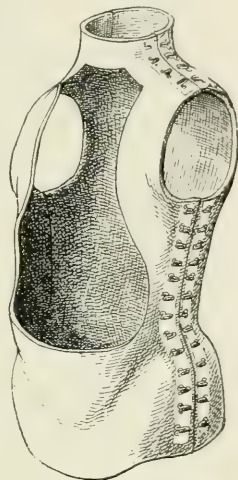


Fig. 79. — Removable plaster corset which can be laced and unlaced by means of hooks fixed on the edges.

2. Removable Apparatus in silicate of potash and leather Apparatus.

I only speak of these to *dissuade you* from using them.

Indeed, apparatus in silicate are too **heavy** and too *friable*.

As for leather apparatus, they are *not firm* (they do not keep their shape without an armature), they are *heavy*, not *clean*, and are *evil smelling*.

3. Apparatus in celluloid.

Do you wish for an apparatus *light, firm, clean, really neat?*

Then use *celluloid*.



Fig. 80. — The positive mould (for coxitis).



Fig. 81. — The celluloid has been constructed upon the mould; it has not yet been removed from the mould (v. fig. 99.)

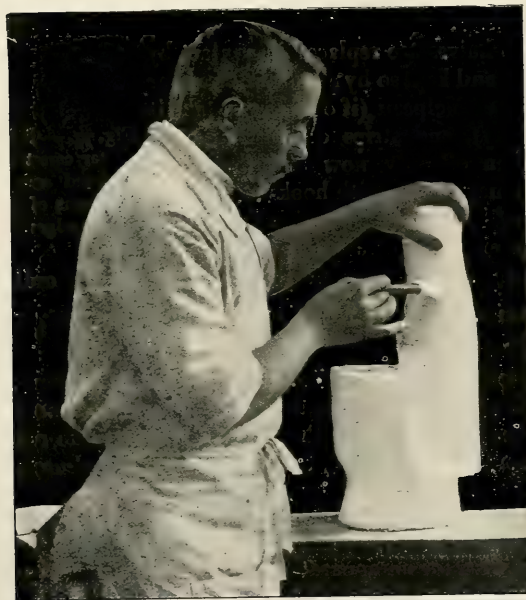


Fig. 82. — Method of constructing a celluloid apparatus (for the hip). Squares of muslin are spread upon the mould with a brush dipped in celluloid paste.

Celluloid taking more than twenty-hours to solidify, cannot be constructed, like plaster, on the subject, who would have fifty times the chance of losing the correction before the celluloid became solid. It should be constructed on a mould (fig. 80).

You may prepare the celluloid yourself if you wish¹.

One constructs it with squares of muslin impregnated with celluloid paste. This paste is made with acetone and the debris of celluloid (about five parts of acetone to one of celluloid).

Instead of using muslin strips, one uses squares.



Fig. 83. — Construction of the celluloid corset. On the positive mould, and covering the whole of its anterior surface, is applied a square of muslin. (Another square is applied afterwards on the posterior surface).

The squares are made of a length equal to half the circumference of the mould. The first square is applied in front, the second behind, the third on the right side, the fourth on the left, alternately, so that the celluloid apparatus has a thickness everywhere of sixteen sheets of muslin or thereabouts. The thickness ranges from 8 to 10 sheets (for a hand apparatus) to 20 sheets (for a large celluloid corset for an adult).

A brush is used for applying the celluloid. One commences by applying over the mould a layer of oil, then a square of muslin (impregnated with the

1. As we used to do formerly. Indeed we constructed the first celluloid apparatus in France.

paste); one pulls upon it, to adjust the edges, afterwards a layer of the celluloid paste, then a sheet of muslin, and so on. One lays on the celluloid and the squares after the manner of bill stickers.

One may construct the celluloid apparatus in the rough at one sitting of about half an hour; after that, over the last sheet of muslin, two or three coatings of paste are laid on, repeating this every three or four hours, until

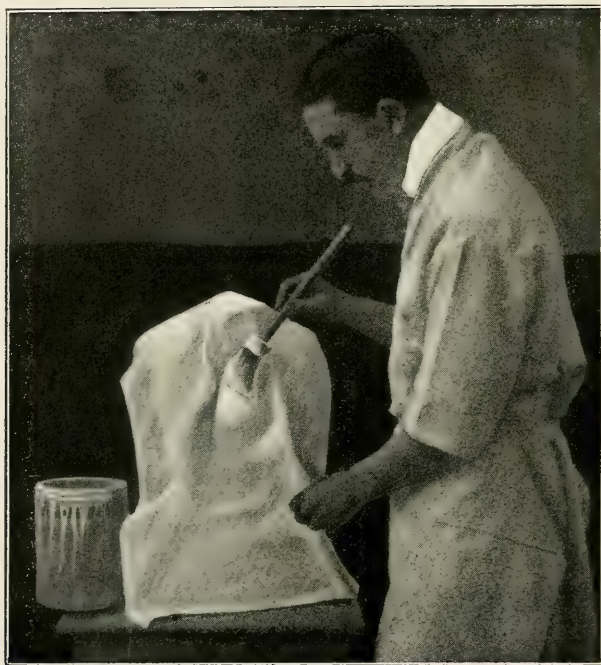


Fig. 84. — The construction of a corset (continued). By means of a brush steeped in the celluloid glue, the square is flattened down, at first in the median portion

one reaches the number of 10 or 12 coats; this will give the celluloid polish and brilliancy.

After that, leave it to dry for two days, without touching it. Then the celluloid may be taken off for the fitting.

To take it off, one cuts along the lines, where, later on, one will lace the celluloid (fig. 81).

The fitting having been accomplished, it is replaced on the mould; the metal strengthening pieces and joints, if there are to be any, are added.

But, if you have not the aptitude for work of this kind, you run

the risk of failing; in any case, much time and care will be required of you, especially when the apparatus is to have several joints. It is infinitely simpler, more practical, and finally, less costly, after having taken the mould, to send it to the special workers in celluloid¹.

They will construct the apparatus and return it to you if necessary for a fitting, and, after that fitting has been done by you on the



Fig. 85 — The construction of a corset (continued). — The edges of the square are coated over, while you pull with the other hand to efface the creases.

patient, who thus need not be disturbed, they will trim and finish the celluloid.

Thus the whole thing will be reduced to your taking the mould and fitting the apparatus, two things very easily done, if you proceed in the following manner :

I. The Moulding.

You have never made one and the very thought of having to take a mould dismays you. Very well, be reassured; without having

1. Such as we have at Berck, in the Orthopedic Institute, and as there are now almost everywhere in France.

made one, nor having even seen one made, you will succeed at the first attempt, for to take a mould, it is sufficient **to construct an ordinary plaster** on the bare skin, and to remove the plaster after it has set; after which, the edges of the plaster are brought together, to restore its shape, and thus a perfect negative is obtained.

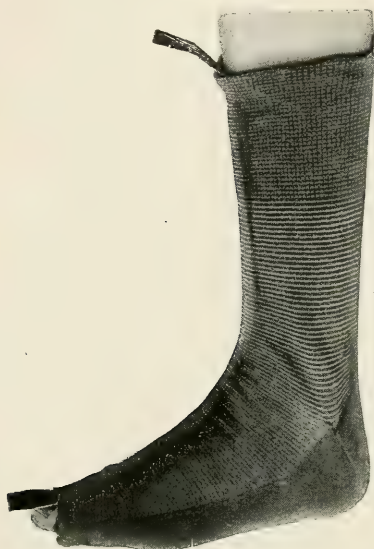


Fig. 86. — Moulding of the instep.

Cover the skin with an ordinary stocking cut off at the toes to allow a strip of zinc being inserted between the skin and the stocking over which the mould may be cut, in order to remove it.



Fig. 87. — Placing the attelles for the moulding of the instep. You commence by applying squares of plastered muslin. Over these you roll a plastered strip.

The position in which the patient is placed for moulding is, as a general rule, the same as that adopted in constructing a plaster apparatus for the same region.

For the lower limbs (foot, leg, hip), it should be the horizontal position; for the trunk, the vertical position.

The patient touching the ground completely with the feet and lightly supported (I do not say suspended, but supported) by the head, by means of the, today, classical strap (fig. 248 and following).

— For the upper limb, the upright position.



Fig. 88. — Moulding of the knee : the leg is covered with the sleeve of a jersey, underneath which has been passed a strip of zinc about three centimetres wide.

But we will now go into details, There are *two precautions* to take.

1. In order that the plaster may *not adhere to the skin* and to the

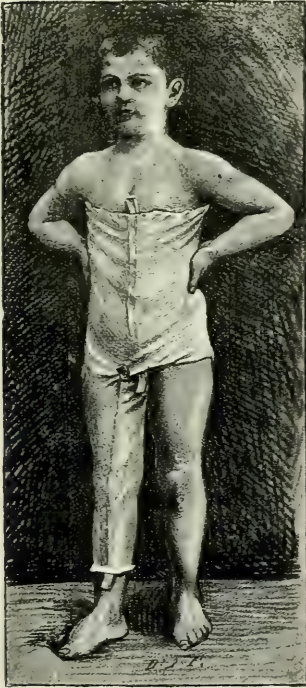


Fig. 89. — The position of the two strips in moulding the lower part of the trunk and lower limb (for a small celluloid apparatus in hip disease).



Fig. 90. — Moulding of the trunk. How to place the strips beneath the jersey.

hair, a thin but continuous layer of vaseline is applied over the whole of the region to be moulded.

You will find in a town Clinic many timorous parents of children who dread the contact of plaster with the bare skin. For these you should make a mould over a closely fitting casing (a jersey, a sock, a stocking). This fabric makes a protective lining to the inner surface of the mould, and comes off with it. So that the adhesion of the covering with the plaster may be more intimate, you commence by



Fig. 91. — Cutting a mould for the knee.
You cut over the zinc strips so as not to wound the patient.

spreading over the outer surface of the covering, a layer of plaster cream before applying the plastered attelles and strips.

2. To prevent all risk of wounding the patient in removing the mould, you place immediately over the skin one or several strips of zinc three or four centimetres wide, upon which you can cut the mould afterwards, as upon a director.

The strips being placed in position, you have only *to construct the plaster*.

You do this with attelles and strips of muslin, after the manner of an ordinary plaster. You may introduce some slight variations meanwhile, thus;

a. Begin the apparatus by the application of squares or attelles, and finish with plastered strips.

b. To hasten the drying of the plaster, that is to say, to save time, you may here use tepid water, at 35° or 40°, or even cold water



Fig. 92. — Cutting a mould of the thigh.

with salt (two or three tea-spoonfuls of salt in each of the two basins in which are the attelles and strips).



Fig. 93. — Cutting a mould of the trunk.



Fig. 94. — The mould having been removed, the edges are approximated and held in contact by several turns of soft muslin bandage.

This premature drying would have some drawbacks to the firmness of an ordinary plaster which has to be kept on for a certain time; it has none here, for a mould intended to be done away with after a few hours, when it has served as a mould or mannequin.

It goes without saying that as soon as you have applied the strips and attelles, before the plaster has **set**, you **verify the position**

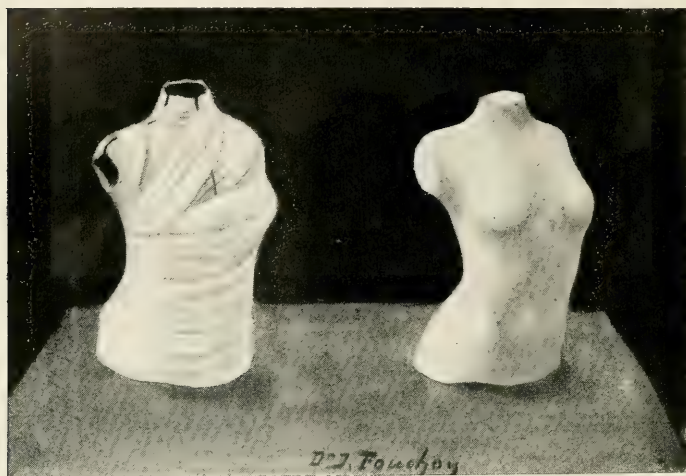


Fig. 95.

Fig. 96.

Fig. 95. — A negative mould (of the trunk) placed upon a bench in readiness for the pouring in of the plaster cream, that is to say, for the preparation of the positive (see following figure).

Fig. 96. — The positive mould obtained from and taken off the negative mould of the preceding figure.

of the region to be moulded and you model the articular or periarticular prominences. You model as well the edges of the zinc strips.

Immediately after the setting of the plaster (or some minutes after) you remove the mould by cutting with a bistoury or an ordinary knife over the zinc lathe, and right down to it, that is to say, you cut also the jersey; you then raise the edges of the mould and, thanks to the presence of vaseline, or of the jersey, the mould detaches itself easily from the skin, without any tugging painful to the patient.

One proceeds with the removal gently and cautiously, so as not to crack the apparatus.

One then brings together the edges and one keeps them in contact either with an attelle of plastered muslin which, encroaching on the two edges, will serve as a "clasp", or with a band of soft muslin rolled round the entire mould.

In order to construct the "positive" one has only to pour into



Fig. 97. — The celluloid corset finished. When it is dry, cut it along the median anterior line and above each shoulder, in order to remove it and to carry out the fitting on the patient.

this hollow mould some plaster cream ¹. But you may avoid this trouble, by employing a worker in celluloid; send him the negative mould, such as it is, and he will reproduce the "mannequin" upon which he will construct the celluloid apparatus.

At the end of a few days, as I have already said, he will be able to send you the celluloid so that you may fit it upon your patient.

1. I refer you, for all the details, to the thesis already mentioned of my assistant, Dr Fouchet.

The fitting of the celluloid apparatus.

Utility of fitting. — You may think that the celluloid, having been constructed on a faithful mould, does not need to be fitted; nevertheless I advise you to make such fitting *whenever it may be practically possible*.

It will afford you an opportunity of correcting, with absolute precision, the length and breadth of the apparatus, the level of the lines of the joints, the situation of any openings and hollows, etc.

Thanks to such fitting, you will be able to obtain, still more certainly, a perfect apparatus, that is to say, without causing any discomfort to the patient, and thoroughly fulfilling its object.

Fitting the apparatus for the foot.

The celluloid is sent to you (by the constructor) in two pieces, one for the foot, the other for the leg, which are divided on a level with the line of the tibio-tarsal articulation, or rather a little below it, on a level with the axis of movement of that articulation. Without this division it would be very difficult to apply the apparatus round the instep.

It goes without saying, that each piece has been split along the anterior median line where the finished apparatus will be laced.

The fitting is done upon the skin, bare, or covered with a sock or very thin stocking.

The two pieces of celluloid are placed in position in turn, pulling them firmly ajar in front (this may be done without cracking, thanks to the elasticity of the celluloid).

Notice that the angles of the celluloid, not yet trimmed, are almost sharp, and to prevent them pinching or lacerating the patient's skin, when the apparatus is put on, you should take care to take these angles between your fingers, calling in the help, if need be, of one or two bystanders.

Verify the upper and lower ends of the apparatus, and especially the width of each piece. If they are a little too wide, let your assistant make the two sides overlap one another, and chalk out from top to bottom, the line of crossing of the edges, that is to say, the limits of the small strips of celluloid to be removed.

If the two pieces are a little too narrow, you mark, in the same way, the distance which separates the two edges, so that the maker may increase, by so much, the width of the fore piece, with a flap of soft leather added to it. One does not leave, in fact, the rigid anterior part of the celluloid, which would make it difficult to take off and put on the apparatus. One replaces it by two strips of soft leather with eyelets.

The foot and leg being covered with their sheath of celluloid, see that the prominences of the malleoli correspond well with the depression in the celluloid. This will satisfy you that the metallic joints are well on a level with the natural articulations and that the pieces of steel will not exert any abnormal pressure on the bony prominences.

You can afterwards mark the limits of the hollowing at the instep,



Fig. 98. — Fitting an apparatus to the foot : the leg portion and the foot portion have been divided opposite the tibio-tarsal articulation and split in front.

which hollowing varies with the degree of flexion you wish to have. But you may be able moreover to dispense with that, for with your written instructions, the maker will be able to give the apparatus the amount of play desired.

For the rest, in a general way, restrict yourself to tracing with chalk the slight modifications which appear to you necessary, without cutting anything off yourself. The maker is furnished with tools to execute more easily and neatly the alterations you require.

He supplies afterwards the apparatus with its articulations, the disposition of which will enable you to leave them rigid or loose according to your liking.

But you will apply the celluloid to the patient yourself, and superintend its use.

Fitting an apparatus for the leg.

In the same way, when fitting on an apparatus for the leg, it is necessary to make certain that the depressions of the apparatus cor-



Fig. 99. — A small celluloid for hip-disease opened and separated from the mould. It is ready for fitting.

respond well with the particular prominences of the region; to verify also the length and width, and to mark with a pencil, the level of the line of the knee-joint (the line which corresponds to a horizontal passing through the point of the patella); and, finally, you should mark on the celluloid, on a level with the popliteal space, the large piece to be hollowed out on the two leg and thigh pieces of the celluloid in order to permit the movements of flexion of the knee, in cases where you wish to preserve those movements. But, as in the apparatus for the foot, you may dispense with that; the maker should easily know, with your written instructions, how to make the posterior hollows and give the articular play required.

Fitting a celluloid for the hip and one for the entire lower limb.

The constructor sends you this large celluloid in four segments; pelvis, thigh, leg and foot, which facilitates greatly the fitting. When the hip or the knee ought to remain rigid, he sends you three segments only.

The small celluloid for the hip is in one piece only.

See fig. 100 for the method of putting on the apparatus.

You commence by placing in position the pelvic segment, the girdle; then you put on the femoral segment. In order not to injure the patient in doing this, cover the angles with cotton wool or with your fingers. The edges are kept in contact either with your hands, or with straps encircling the pelvis and the two segments of the celluloid.

You make certain, here again, that the depressions in the apparatus correspond with the prominences of the region. You verify the length and width of the celluloid.

The thigh of the opposite side should be able to be flexed to

about an angle of 90° ; it is necessary to remember that, in order to hollow, if need be, the apparatus at this point. More than that, if it is desired to put on this (the sound) side a strap of leather or soft

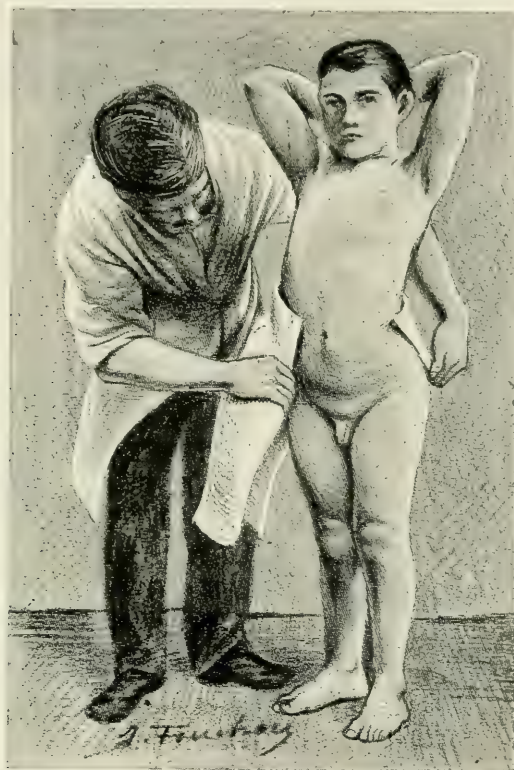


Fig. 100. — Fitting an apparatus for the hip. The manner of putting it on when one is alone. First, open and introduce the pelvic segment, then the femoral. If you have an assistant, you can, with his help, open and introduce the two segments at the same time.

tissue (to prevent the celluloid from rocking) you should indicate the points of attachment and the length and breadth of the strap. Lastly, the upper edge of the apparatus, in front, over the abdomen, is cut in the form of a crescent, in such a way that the middle portion leaves the umbilicus uncovered.

We will describe, in the chapter on Pott's disease, the method of fitting on the celluloid corset (v. p. 327).

CHAPTER II

A WORD ON ANÆSTHESIA IN ORTHOPEDICS

I. — LOCAL ANÆSTHESIA

a. Cocain and *Stovain* are not often used in Orthopedics. They may be used, of course, to perform a tenotomy, when this tenotomy is the only interference required; this is very rare; but in torticollis, in congenital club-foot, in old hip-disease, division of the tendon is not the only factor in the correction, and vigorous movements for redressment are indispensable before and after the tenotomy. These manœuvres nearly always require general anæsthesia.

b. Ethyl chloride as spray is the ordinary local anæsthetic for puncture of an abscess and for intra-articular injections (v. fig. 111, p. 132).

This anæsthetic is sufficient, provided that it is used with care; one waits, to introduce the needle, until the skin is blanched over an area the size of a five shilling piece. Old patients, always ask for « a little more ethyl chloride ».

But avoid the direct and prolonged contact of ethyl chloride with integument which is already reddened and thin, the vitality of which is very low, as the chloride *might* reduce it still more. In that case produce the anæsthesia on the sound skin, some distance away, and there you will puncture.

II. — GENERAL ANÆSTHESIA

This may be produced by **chloroform**, or by **ether**¹.

If you are accustomed to ether, you should keep to it; if not, I advise you to prefer chloroform. Ether is, it is true, a little more easy to administer than chloroform; but it exposes the patient to grave inflammation of the air-passages, which may lead to pulmonary gangrene and abscess of the lung, and more than that, during the whole of the anæsthesia, ether keeps the patient in a state of manifest asphyxia which sometimes becomes alarming.

Therefore, you should employ **chloroform by preference**. There are two remarks to be made on its use in orthopedics.

a. The first is that chloroform as a general rule, is ***much better tolerated by children*** than by adults, who are nearly always more or less out of condition, or are alcoholic, atheromatous, emphysematous, etc.

b. The second is that, in orthopedics, anæsthesia ***does not need***, in an ordinary way, to be pushed to ***its extreme limit***, for example, as far as in abdominal surgery, where it is necessary to avoid the least reflex movements of the intestines. — So, for the correction of a congenital luxation, a coxitis, or for a club-foot, it is sufficient that the patient is insensible to pain and unable to make any movement of a nature likely to hinder the operator; in other words it is sufficient that the muscular resistance is overcome and that the patient does not cry out. You may then, in orthopedics, be satisfied very often with an anæsthesia such as you would use to reduce a traumatic dislocation of the shoulder or perform taxis in a case of hernia.

Now, here are some indispensable notions on chloroformisation. I think it is not a digression to give them here, because they are too often violated or misunderstood, and they do not appear to me to be clearly set forth in the large treatises on surgery.

1. I do not see any advantage ethyl-bromide has over chloroform, and I myself use the latter even for the removal of adenoid vegetations.

The **absolute criterion**, the only one, to know if the subject — infant or adult — put under chloroform, sleeps sufficiently, but not too profoundly, is to see that **his corneal reflex** is retained. *It is necessary, during the whole operation, that the reflex be preserved, whilst the general sensibility and the resistance of the muscles of the limbs are abolished.*

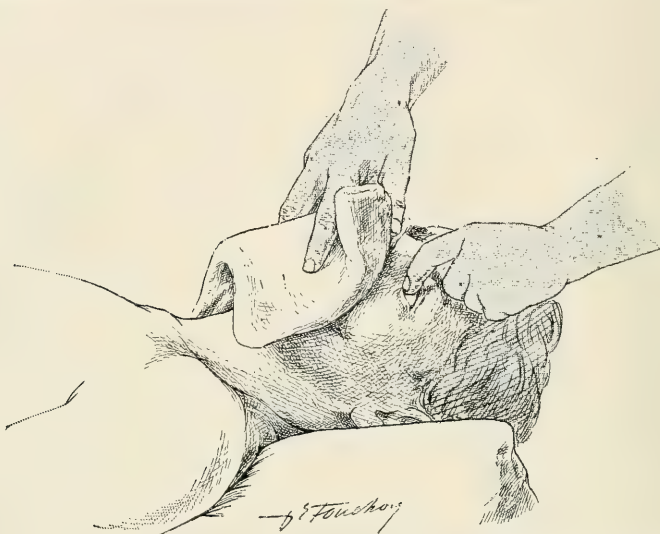


Fig. 101. — The ocular reflex. — First stage; the anæsthetist has partly opened the eyelids of the patient and placed the tip of his index finger on the eye.

By the corneal reflex, one means the contraction, *active and immediate*, of the eyelids (always appreciable in the upper eyelid), when it is left free, after having been stimulated by touching the cornea of the patient with the index finger (fig. 101 and 102). If the patient is insensible and inert, at the same time that the contractility of the eyelids persists, the anæsthesia is sufficient for what is to be done; orthopedic corrections, and surgical operations.

Anæsthesia has then been sufficiently « pushed ».

One is certain that it is not too much so, as long as the corneal reflex remains. Security is then complete.

During the whole of the operation, do not exceed this degree either on this side or on that, but preserve it by a few drops of chloroform administered from time to time.

When the patient has lost the corneal reflex, one does not know where one is, and it may be one has gone too far.

Apart from the corneal reflex, no sign is of absolute value.



Fig. 102. — The ocular reflex. — Second stage: anæsthetist, after having touched the cornea, quickly removes his hand to allow the eyelid to close. The eye ought to close firmly, *in an active fashion*, which can be recognised by the folds which are formed at the commissure.

The respiration, the pulse, the color of the face, the dilatation and contraction of the pupil, do not signify very much. The respiration may even remain perfect, the pulse normal, the face of a rosy colour, the pupil contracted, and everything, in a word, may appear up to that point satisfactory, when suddenly, without any warning, the respiration and the pulse stop, and then, it may be too late.

Rely then entirely on the corneal reflex; it alone will not deceive you.

The talent of the anæsthetist consists precisely in attaining

this condition, and in keeping constantly to this degree of anæsthesia, to take care on the one part, not to allow the patient to awaken, which is evidenced by the movements of defence of his limbs or by his complaining; to prevent on the other, narcosis becoming too profound, which is ascertained by the loss of the ocular reflex.

In the first case, if the patient makes some movements of defence (still being unconscious), give him six or eight drops of chloroform every eight or ten respirations (do not hurry, do not give the chloroform in large quantity at this moment) until again he is motionless.

In the second case, when the ocular reflex has been lost, stop, do not give any more chloroform until the reflex has reappeared : — and so on, until the end of the chloroformisation.

1. The ordinary method of producing sleep. For children who understand, above 10 years of age, proceed gradually by slight and continuous doses as you would do for an adult.

Every six or eight respirations, throw six or eight drops of chloroform upon the outer surface of the mask, turning it quickly over upon the child's face.

2. The method of producing sleep instantly. If the child is very small, or very nervous, if fear and alarm causes him to cry and struggle violently at your approach, if he resents all your coaxing, if he will not be soothed nor listen to anything, it is better for him that you proceed expeditiously and put him to sleep quickly.

Whilst his hands and feet are held, quickly throw fifteen or twenty drops of chloroform upon the mask and apply it quite closely to his face, without allowing the admission of any pure air. His cries will at once cease; the child struggles for scarcely six or eight seconds; he quickly loses all knowledge of his surroundings. You keep the mask in position for ten or fifteen seconds only. The child's face is a little

congested, but it is already motionless, having however the ocular reflex still plainly marked.

You proceed from this moment very gently, with six or eight drops every six or eight respirations, the face regaining its rosy hue in a few seconds.

If the first whiffs of chloroform have not been sufficient to



Fig. 103. — Withdrawing the tongue ; with the left hand the tongue is drawn out of the mouth; the index finger of the right hand firmly turning out the labial commissure from the dental arches.

abolish the defensive movements in a child of six or seven years, for example, give a second dose, proceeding as has been already explained.

During narcosis always take care to support the patient's chin with your fingers; that facilitates the respiration greatly. If he vomit, it is because he is awakening. Give him another dose of chloroform, slowly, without too much hurry; that would be dangerous.

If respiration has ceased (but that will not occur until the ocular reflex has been lost, which will not occur if

carefully watched) one should immediately withdraw the child's tongue with special forceps, or, in default of them, with a safety-pin, keeping it outside by exerting slight traction on one side, the head being turned and laid on that side, whilst, with a finger introduced into the mouth between the teeth and the opposite cheek, the cheek is raised (fig. 103).

This manœuvre of withdrawing the tongue and raising the cheek suffices nearly always to restore the breathing.

If it does not suffice, perform artificial respiration. Remember that in such a case it is the only thing to be done and do not lose time in doing anything else. The anaesthetist supports the head, not too much flexed, nor too extended, on the table : to allow it to hang over the table, as advised by some authors, is bad; it might produce too great tension, and consequently a partial closure of the air passages. An assistant holds the legs as a counter-resistance to the traction which you yourself make on the upper part of the trunk, in manœuvring the arms to produce artificial respiration : but I need not insist on that — you know all about it. The manœuvres of artificial respiration are studied and illustrated in all the treatises on minor or major surgery.

I wish to conclude with two observations :

a) When you are about to redress a case, you should not allow the patient to awaken until the proceeding is quite finished and the plaster « set ». Allow the patient to awaken gently.

b) Lastly, I wish to point out that when the patient is ready to awaken, he appears sometimes to have lost his ocular reflex and his respiration become all at once silent. Do not be alarmed; press a little harder on the cornea, and you will see the eyelid react; moreover, the complexion instead of being pale, is here as rosy as that of a person sleeping naturally.

CHAPTER III

THE TECHNIQUE OF PUNCTURES AND INJECTIONS

I

IN THE TUBERCULOUS SUPPURATIONS

Take note from the beginning that this technique is the same for all tuberculous suppurations, equally well hip-disease and Pott's disease as cold idiopathic abscesses.

SUMMARY OF THE TECHNIQUE¹.

A. What it is necessary to obtain.

1° As to **instruments**: a needle, number 3, a small aspirator, a glass syringe (all these instruments should be capable of being boiled).

2° As to **modifying liquids**: 2 flasks, one of **oil, cresote, and iodoform** (oil 70 grammes, ether 30 grammes, creosote 5 grammes, gaiacol 1 gramme, iodoform 10 grammes).

The other of **naphthol camphor with glycerin** (naphthol camphor 2 grammes, glycerin 12 grammes); this second mixture should be shaken vigorously for a minute and a half and injected **immediately**, because it is very unstable.

These two liquids are all that are required.

The **indications for each**: As a general rule, inject the first of them (the oil). — You may reserve the second (naphthol camphor) for the case where an abscess contains clots blocking the needle, in which case two or three injections of naphthol camphor will soften and dissolve the clots; after which, you return to the first liquid.

The **dose** to inject is the same for the two liquids, namely; 2 to 12 grammes, according to the age of the patient, for abscesses of a capacity of 20 cm. c. and more.

If the abscess is very small, less than 20 cm. c., you inject half as much liquid as of the pus withdrawn. In this way all hyper-tension of the skin is avoided.

3° Have also: a) a tube of ethyl chloride for local anaesthesia and some

1. If you are pressed, for time, content yourself with reading this summary where are collected all the leading ideas — returning later to the reading of the entire chapter.

tincture of iodine for sterilization of the skin; *b*) a small boiled cup, to contain and take from, the liquid to be injected; *c*) and, lastly a sterilized dressing.

B. The Technique.

When should you commence the punctures?

Immediately the abscess is plainly perceptible, provided you can get at it without danger. (But, this danger only exists for deep abscesses in the iliac fossa; here, you may postpone the puncture until the abscess has become easily accessible).

For this technique, there are two recommendations; be *very clean* and use *fine needles only*.

a. To be **very clean**; be quite sure of the asepsis of your hands, of the patient's skin, of the instruments, of the liquids to be injected, of the after dressing.

b. Employ only **fine needles** instead of the large trocars generally used; keep to our N° 3 needle (which has an outer diameter of only one and a half millimetres).

Needle N° 4 must only be used when the abscess is far removed from the skin and its contents very thick. In no case should a needle larger than N° 4 be used.

Other Recommendations.

c. **Puncture in healthy skin**, at a distance of 4 or 5 cm. from the abscess, in such a way that the two orifices in the skin and the abscess are separated by a long oblique track.

d. And at **each new puncture**, prick the skin at a **new point**.

How many punctures?

You may make several punctures and injections (from **7 to 8** and not one only) — for the cures will be so much more certain than with one puncture only.

At what intervals?

When should the second puncture be made? Ten days after the first.

And the others at equal intervals of from **10 to 12 days**. After the seventh or eighth sitting, the walls of the abscess are so sound, so healthy, that it only remains to seek for their **adhesion**.

With this object, at the last sitting, after having made a last puncture (without injection) you **compress** the region, beginning at the extremity of the limb, with layers of cotton wool, held in position by 2 or 3 Velpeau bandages. — Every four or five days one adds over this dressing a new Velpeau bandage which keeps up the pressure to the degree required.

On the fifteenth or twentieth day, the dressing is discontinued. The abscess is cured.

The duration of treatment of a cold abscess (essential or symptomatic) takes then, from two to three months on an average.

All well informed medical men of today know that of the three treatments proposed for the external tuberculoses

a) **operation**, b) **abstention** and c) **puncture with injection**, the last is the best (we will tell you in Chapter IV why it is the best). But how many know how to apply this best treatment?

Very few.

Often times, one may see, by the side of abscesses opened by surgeons, other cold abscesses which have become fistulous **in spite of** punctures and injections, or even **because** of punctures badly made.

Does this mean that puncture is difficult? No, not exactly, but it must be performed with scrupulous care, and no one has ever taken the trouble to teach practitioners.

Everything depends upon the way it is done.

Well done, puncture cures; it is a marvellous method.

Badly done, it leads to failure, sometimes to accidents, it may even bring about death (in the case of abscess by gravitation, of coxitis or of Pott's disease).

This is why it is your pressing duty, your « sacred » duty, to study their technique thoroughly.

You may make mistakes in three ways : by instrumentation, by lack of asepsis, by faulty technique.

1° By instrumentation.

You may go to work (it is unfortunately the rule) with needles or trocars too large; the orifice in the skin does not close, and there remains a fistula.

2° By lack of asepsis.

On the pretext that it is not an abdomen to be opened and that the puncture ought to be repeated, only an indifferent attention is bestowed to the case; only a very casual asepsis is made of the hands, of the patient's skin, of the instruments, or of the liquids to be injected.

And this is particularly serious; for the liquids remaining for some time in a closed vessel will be under the best of conditions for giving birth to microbes.

3° By the technique.

Too many or too few punctures are made; at intervals too short or too long, with liquids too active or not active enough, and that is why the abscess persists indefinitely, or even ends by opening spontaneously.

These are the mistakes which may be made in the course of treatment by puncture.

But, the mere fact of my pointing out these faults will help you to avoid them, with a little attention and method.

When all comes to all, remember that this technique is at once *very delicate* and *very simple*.

Very delicate, in the sense that it demands minute care and a strict asepsis.

Very simple, nevertheless, and each of you, to do it well, will only need to read, and to remember, that which follows.

THE MATERIEL

The necessary instruments have been put together by Collin, in a small case which every practitioner ought to possess, as it may prove useful, not only for the treatment of external tuberculoses, but also for punctures and injections in any other disease.

1° **The needles.** — The case includes a set of four needles : nos. 1, 2, 3, 4.

The needles nos. 1 and 2, serve for simple **injection** without preliminary puncture, that is to say, in cases of dry tuberculosis (which we shall deal with further on, v. p. 164). These two needles have no side holes : that would be an inconvenience.

1. The dimensions of the needles of our series, as made by Collin are :

	external diameter	internal diameter	length.
n° 1	85/100 millimetres	65/100	9 centimetres
n° 2	115/100 millimetres	75/100	—
n° 3	155/100 millimetres	110/100	—
n° 4	200/100 millimètres	155/100	—

On principle, you always take the *finest needle* the n° 1.

It suffices for very fluid liquids (iodoformed ether, iodoformed creosote oil.....).

The needle n° 2 is used for liquids which are rather viscid, such as the glycerinated naphthol camphor.



Fig. 104. — Everything necessary for puncture and injection. Going from left to right : sterilized cotton wool, glycerin, naphthol camphor, Calot case, tincture of iodine, ethyl chloride, Velpeau bandage, cup, iodoform creosote oil, sterilized gauze. (a basin for pus). For gloves, see fig. 108 and 109, p. 130.

The needles N° 3 and 4 serve for **punctures**, that is to say, in tuberculous suppurations where the injection is always preceded by a puncture. The needles 3 and 4 have side holes, which is an advantage here.

Use here in the same way, for puncture, the finer needle (the



Fig. 104 bis. — These are the external diameters (actual size) of the needles. The n°s 1 and 2 serve for injections; the n°s 3 and 4 for punctures.

N° 3) : it will protect you most surely against the risk of a fistula.

A needle smaller than N° 3 might easily be blocked by the more or less clotted contents of an abscess¹.

A larger needle exposes you somewhat to a fistula, I repeat it.

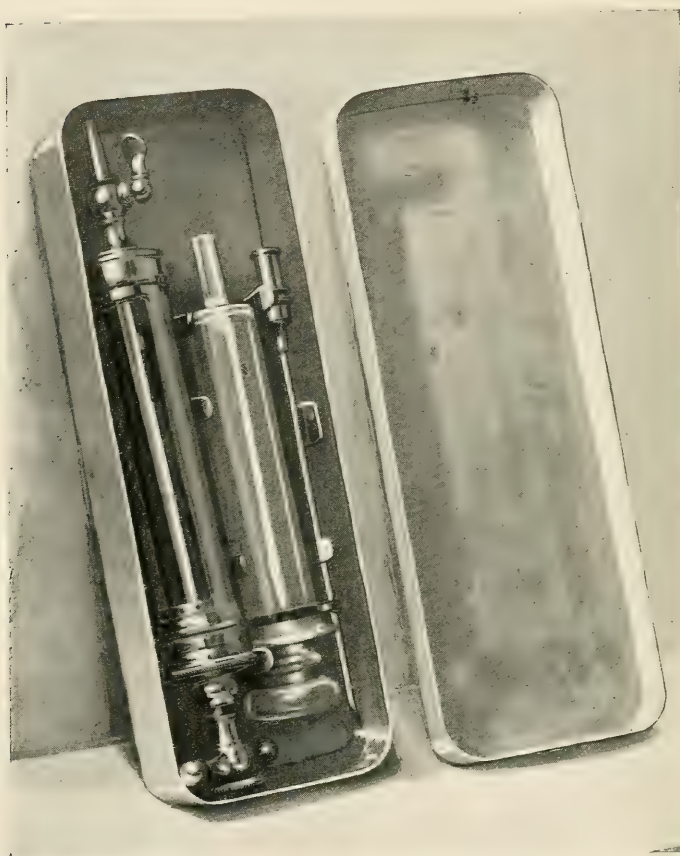


Fig. 105. — Our instruments. A metal case containing ; an aspirator, a glass syringe, one or more needles.

And that is why you must use N° 4, only in case of **necessity**,

1. Nevertheless, when abscesses are very mature, and contain very serous fluid, the needle No. 2 may suffice : try it.

when you have found N° 3, previously tried, to be blocked by the excessively thick contents of the abscess. You might use N° 4 when dealing with an abscess situated far below the surface of the skin (over five or six cm.)

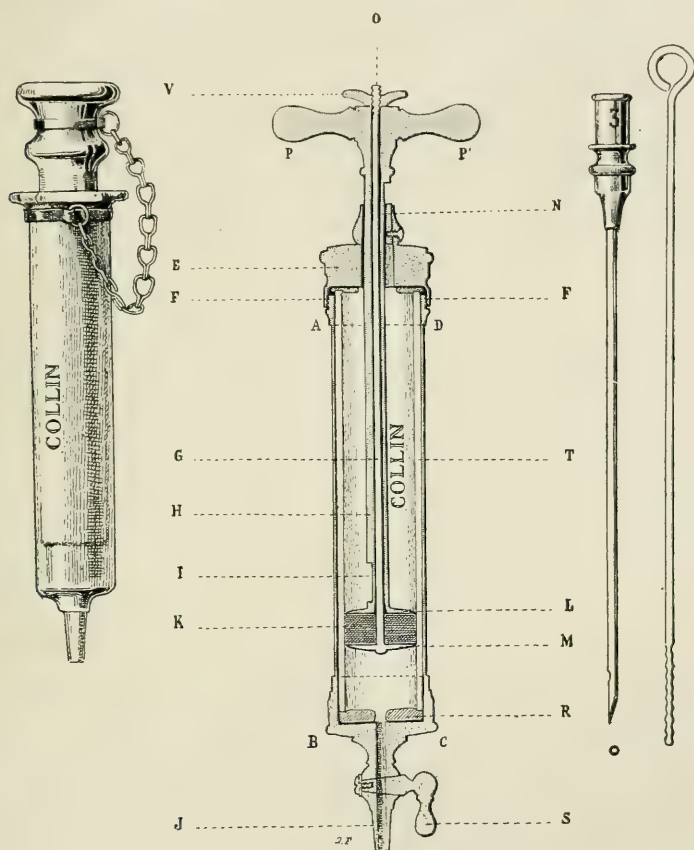


Fig. 106. — Schematic plate (Collin). From left to right : glass syringe, section of the aspirator, needle N° 3 with an o, indicating the internal diameter of the needle, a wire having at its extremity a screw for cleansing the needle.

But never, under any pretext, use the higher numbers 5, 6, 7, which you find in some cases : you would run a great risk of producing a large fistula.

2° The aspirator. Our model (v. p. 121) is very easy to regulate, to sterilize and manipulate.

a. It is **regulated** by means of two screws E and V (fig. 106) at the extremity of the glass tube and at the end of the rod of the piston.

On tightening the thumb nut V which terminates the rod, the asbestos piston K is enlarged, and water-tightness secured.

On tightening the other screw E, you ensure the contact of the glass tube with the two washers of india-rubber placed at its two extremities. (In this way the vacuum is assured.) The screws are loosened when you wish to take the instrument to pieces.

b. It can be **sterilized** conveniently by simply boiling (thanks to its piston of asbestos which is not affected by immersion in boiling water however much prolonged).

The *capacity* of the aspirator of the ordinary model is only 10 c.c. But this is quite sufficient in practice, because it is easy, in dealing with a large abscess, to empty and refill the aspirator as many times as may be necessary until the evacuation is complete. And, thanks to its small capacity, it has the advantage of allowing one to evacuate the abscess progressively, and without any danger (or scarcely any) of causing the wall of the abscess to bleed, while that danger exists in using aspirators of larger capacity.

This small aspirator, with its 10 cm. c. is almost too large for aspirating certain small abscesses, for example, broken down cervical gland; in that case, it would be wise, in order not to draw blood, to open the cock but very little, so as to draw off the pus drop by drop. And as soon as a depression in the skin is produced showing that the walls of the abscess have come in contact, or when the pus issues slightly tinged, you immediately turn the cock of the aspirator.

All you have to do to make the aspirator ready, so as to create a vacuum, is, the cock being closed, to draw the stem of the piston up to the end of the barrel and give it a

quarter of a turn, when a notch there allows it to be fixed in that position.

3° **The syringe.** The glass syringe may easily be boiled; it is adapted like the aspirator, to the flange of the needle. Aspirator and syringe could, in case of necessity, supplement each other, but it is necessary to have the two, because, in the first place, one is never taken unawares, and in the second, it is much more simple to aspirate with the aspirator, **by reason of its cock which allows a vacuum** being secured **before** using it. And it is also easier and more natural to inject with the syringe than with an aspirator, especially when an injection has to be made without a preliminary puncture.

Our aspirator being « in order » (where the vacuum is perfect) you hold it in the right hand, whilst the left hand holds the needle, the evacuation is made without any traumatism; on the other hand, when you aspirate with a syringe which it is impossible to exhaust beforehand, you always produce jerks and repeated pullings on the wall of the abscess. The jerks are **painful** to the patient, they cause slight hoemorrhage, they interrupt, at every movement, the contact between the needle and the syringe.

You will find, besides, in the Collin case, one washer of asbestos and two reserve india-rubbers (and you might also ask for the addition of a spare glass barrel for the aspirator, which you could easily adapt yourself).

The permeability of the needles is provided for by the addition of a metallic thread (cleaning wire).

The cleaning wire of needles n^{os} 3 and 4 has a screw thread cut at its extremity; this allows of its acting as a cleaning brush (each time it is used).

The method of sterilizing the instruments.

The aspirator and syringe (previously taken to pieces) are placed with the needles in the small metal case. The case,

opened, is plunged into a closed fish-kettle full of water, to which has been added some borate of soda, in the proportion of 15 to 20 grammes to the litre (this solution boils at 105° to 106°)¹. The water at the moment you plunge the case into it is cold; raise it to boiling point — which should be kept up for from half to three-quarters of an hour.

Cleansing the instruments.

After each time they have been used it is necessary to clean the instruments thoroughly.

The grease should be removed first with alcohol and ether. To thoroughly cleanse the needles brush them through with the screw at the end of the wire, already mentioned. After cleansing, boil the instruments again. Afterwards, wipe them with gauze or sterilized wool, or pass them through alcohol or ether, when they will dry spontaneously.

Give them a coating of oil, insert the cleansing wires into the needles. Replace the whole in the metal case, which must be always kept perfectly clean.

Before each new puncture, boil the instruments again, but this time it may be for five minutes only, if they have been boiled for half an hour after they were last used.

1. Note this well. It is generally believed that the instruments must be put into the water when it is already boiling, as without this precaution, they would be tarnished. Well, it is a mistake, we have never seen them tarnished or damaged by placing them in cold water gradually heated to boiling point; moreover in the latter way, all risk of breaking the glass barrel of the aspirator, as is likely to happen if you plunge the instrument suddenly into boiling water, is avoided. I must warn you not to pass the steel needles through the naked flame as it blackens and corrodes them; it detaches the nickle and quickly puts them out of use; and especially because this method of sterilization is infinitely less certain than prolonged boiling for half-an-hour.

If you possess platinum needles, you might pass them through the flame without detriment; but these are very expensive (they cost five or six times as much as the needles of nickled steel). It is then more practical for you to keep to the latter. If the nickelling is good, if they are well cleansed each time after use, then oiled over, the steel needles can be preserved for an indefinite time, in spite of repeated boilings.

THE MODIFYING LIQUIDS FOR INJECTIONS

There is an infinity of medicated agents suggested for the local modification of external tuberculoses.

None of these substances is infallible, but there are four or five at least, which are good, with which it is possible to obtain

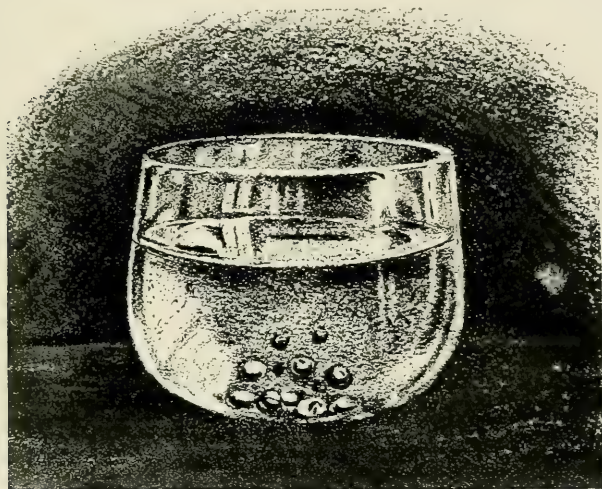


Fig. 107. — The pure camphorated naphthol in water. If you allow a few drops of camphorated naphthol to fall into water, it remains in a state of separated spherules which, if they were introduced into the blood stream, would possibly cause embolism. These spherules are not produced when you throw into the water a few drops of the mixture of naphthol and glycerin which has been well shaken.

a cure, provided that *you know how to use them*; for the technique is a more important thing than the nature of the injection, and there are medical men who will never arrive at a cure with liquids of any kind.

I do not mean to say, however, that all these liquids are equally valuable, far from it, seeing that, after having tried them all, I enjoin you to keep to the two following ones which will suffice for all your needs a) iodoformed oil and cresote, and b) the glycerinated naphthol camphor.

But I have already spoken of them and have given the formula at the beginning of this chapter (v. p. 115).

Another word upon the subject of glycerinated naphthol camphor. Before injecting this mixture, you must make sure that it is miscible with water. You throw a drop into a basin of water and shake it. If the drop of the mixture does not disappear in the water, increase the proportion of glycerin, stir well the new mixture and again perform the control experiment in the water. (Doctor Cayre, of Berck).

A propos of the indications for the two liquids, I would add, that the naphthol camphor should be preferred for an abscess not yet ripe, for example, those large swellings where one withdraws only a few drops of pus, the centre alone being fluid, the rest of the mass being formed of fungosities not yet broken down. In injecting naphthol camphor into the small cavity, the abscess ripens; each new injection liquifies successively the several layers of the tuberculosed wall.

And it is for this reason that a few days after injection of naphthol camphor, when making a new puncture, one withdraws a larger quantity of pus than at the first puncture, a larger quantity on the third than at the second, etc.

As soon as the softening appears complete, it is better (as I said before) to continue and complete the treatment with the injection of cresoted oil.

Iodoformed Ether is an active and efficacious liquid, but it is not without drawbacks; it *causes pain* and is especially liable to cause separation and sloughing of the skin.

It ought never to be used in cases where the skin is already thin and red-dened; it may produce rupture of the skin, by the tension it sets up. True, one may let it run out again partly or wholly; but that *mode of procedure* is neither very *precise* nor very *certain*. In fact, one is never certain that there will not remain, in spite of everything, sufficient ether to distend the skin beyond the limits of its resistance, — without mentioning the cases, rare but nevertheless always possible, where the liquid injected does not return at all, or, it does not return as much as one would wish. (A parallel disaster to this is sometimes seen to follow injections of tincture of iodine into the tunica vaginalis, in the treatment of hydrocele).

There are two cases, especially, where you should never employ iodoformed ether :

a. The first is in suppurating glands in the neck; with ether you risk seeing the skin give way, and you know the consequence : a hideous and ineffaceable scar!

b. In the abscess by gravitation of Pott's disease, because iodoformed ether may cause a rupture of the sac into the peritoneum or intestine. (I have known of this in several cases.)

But on the other hand, you may employ iodoformed ether where the skin is quite sound, in the abscess of hip-disease or white swelling, or in an abscess deeply situated in a limb. You might, at any rate, inject a small quantity, 3 or 6 c.c. of iodoformed ether — a twenty per cent solution.

You will leave it to run out two or three minutes afterwards, but if perchance it does not do so, you need not be alarmed, for the quantity injected is too small to bring about any untoward result. It is for this reason that you will never on principle inject more ether than the utmost quantity you know for certain can be retained.

The tension produced by this quantity of ether is not excessive, and it doubles the certainty of the efficacy of the iodoform injected. The proof that the tension produced by the ether is a factor in the cure is that you are able sometimes to cure with injections of pure ether, without the addition of creosote or iodoform, cold abscesses, essential or symptomatic.

How do the injections act and how do they cure?

The problem has been solved in the laboratory of our master. professor Robin. by Coyon, Fiessinger and Laurence.

They have shewn that the injections do not act as antiseptics; no, because of the thickness of the wall, of the intricacy of the cavity, of tuberculous infiltration in the neighbourhood and also of the deep situation of the bacilli, the « antiseptics » of tuberculous abscess is as illusory as intestinal antiseptics.

The injections act by provoking a great afflux of white cells, of polynuclear cells, afterwards destroying them, thus setting at liberty certain ferments; the first is a lipolytic ferment having the property of attacking the fatty envelope of the bacillus, later on, a proteolytic ferment (a protease) having the property of liquefying and digesting albumenoids, that is to say, of destroying the very substance of Koch's bacillus.

The Method of sterilizing the modifying liquids.

You may sterilize them yourself, as we are in the habit of doing.

To sterilize the first liquid, the creosote oil, you begin by boiling the oil for half an hour. (If the oil is of good quality, it does not blacken on boiling.) Then you allow it to cool, and throw into it the creosote, the gaiacol and the iodoform, all chemically pure, and lastly you add the ether. For the second liquid (naphthol, camphor and glycerin) you boil the glycerin for twenty minutes (it boils at 150°), then allow it to cool, and throw into it the desired proportion of $\frac{1}{6}$ to $\frac{1}{7}$ of naphthol camphor prepared aseptically by your pharmacist, under your direction.

It goes without saying that you will boil the flask and the cups.

Lastly you will take care to preserve the liquids in well stoppered flasks, keeping them protected from the light.

TECHNIQUE OF THE PUNCTURE

We have to speak here of the technique only. The **diagnosis** of **cold abscess** and the **study of exploratory puncture** (as a means of diagnosis) will find their place better elsewhere. (v. chap. XIX).

However, we ought to say, now, a few words on the **indications** for puncture in the treatment of cold abscess.

The indications for puncture in cold abscess.

a. Is it necessary to puncture every abscess?

Yes, if it is an abscess you are able to reach without the risk of wounding some important organ. Suppose you are in the presence of a deep abscess of the internal iliac fossa; wait to puncture it until it has become superficial.

b. Why puncture the abscess instead of trusting to its spontaneous resorption?

1st. Because spontaneous resorption is the exception, and by thus waiting, you run the risk of seeing the abscess unexpectedly invading the deep surface of the skin; after which you are no longer certain that you will be able to prevent its rupture and a consequent fistula.

2^{ndly}. Because, in the case where reabsorption has occurred, it requires a *very long time* (one or several years).

3^{rdly}. Because when the **abscess has been reabsorbed**, the cure is not **so sure** and not **so definite**, in a general way, as with the abscess which has been cured by puncture and injection.

In fact, when we say that a cold abscess is reabsorbed, that means that there is no more liquid, but surely not that all the infected and infecting elements in its wall have disappeared. The cold abscess has perhaps simply returned to its former condition, that of a **tuberculoma** and at this time even though there is nothing to be felt on palpation, it may still retain bacilli which are quiescent, **and in fact, one has often observed the return** of these abscesses so called “**reabsorbed**”.

On the contrary, when the contents of such an abscess and the morbid elements in its wall have been got rid of by successive punctures¹, one can conceive, and clinical observation confirms it, that the cure obtained should be more complete.

4^{thly}. A last reason for employing punctures and injections in abscess by gravitation is, that the liquid injected does not act only on the abscess to be cured, but it reaches the bone and the articulation which have caused the abscess, rendering them sound and cicatrising them. — So much so that it may be said in all truth that the patients, provided that we treat them by puncture and injection, will be cured more quickly and surely than if they had not had an abscess.

When ought one to puncture ?

Immediately the abscess is recognised (except in the case

1. We are in the habit of saying, at the familiar causeries in our practice, that it is better to see an abscess in a receiver than trust to its absorption into the tissues.

However, when the general condition of the patient is very bad, one ought to wait a while; in the mean time, do nothing more than is absolutely necessary in the way of local treatment, to prevent the opening of large abscesses. In such a case, endeavour in every way to improve the general condition of the patient. But we shall see about that in the chapter on multiple tuberculosés (chap. xx.)

already cited of a deep iliac abscess or a retropharyngeal abscess). It is necessary to begin before the skin has been invaded, before it has become reddened or thin. If not, *it will be too late* to save the skin already inoculated, already invaded by tubercles in the abscess wall¹; you would not be certain of escaping a fistula and its terrible consequences. And even when

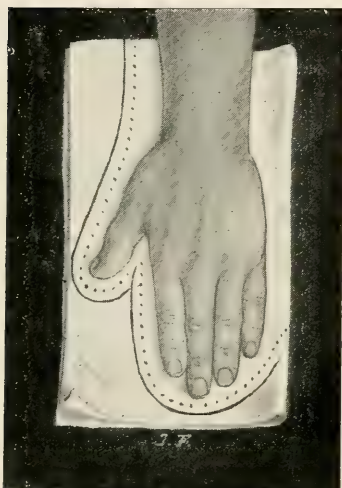


Fig. 108



Fig. 109

Fig. 108 and 109. — Mittens made at the time of the operation, with sterilized compresses for the case where you have touched septic matter.

Fig. 108. — The method of making a mitten. Fold a compress into two, lay the hand flat on the square so made, cut the two thicknesses, following the outline and baste them together or stitch them with the machine following the dotted line.

Fig. 109. — Afterwards turn them inside out « like a glove » so that the sewing is inside.

this red and thin skin does not break, it will very likely be puckered and pigmented; which, in the neck, for example, is always as hideous as a veritable cicatrix.

1. In the same way that the skin of the breast may be invaded, after a certain time, by malignant growths of the subjacent gland.

The Puncture.

The patient is left in bed, or better still, placed **upon a table**, the region of the abscess well **exposed**.

Have at hand the necessary objects (v. fig. 104), the case



Fig. 110. — An opening arranged in a corset of plaster to allow of the puncture of an iliac abscess. At the moment of puncture, the edges of the opening will be covered with sterilized towels, in the way shewn in the following figure, fig. 111.

containing the three sterilized instruments, the tincture of iodine, the cup, the two flasks of liquid, and the dressing.

You proceed to make the toilet of your hands and of the patient, taking as much pains as if you were going to open an abdomen.

a. Toilet of the hands. — Rub the hands for several minutes with a coarse brush in oxygenated water (this is particularly recommended), or, wash them thoroughly in warm soapy water; after that, rub them with alcohol and ether and steep them in a warm solution of sublimate, one in a thousand.

It would be better to wear india-rubber gloves. They are indispensable **when you have been touching wounds or matter which is septic.** In default of gloves, postpone the puncture until the next day unless there is extreme urgency, (for example in the case of an abscess which is about to open), in which case you might make a puncture, without an injec-

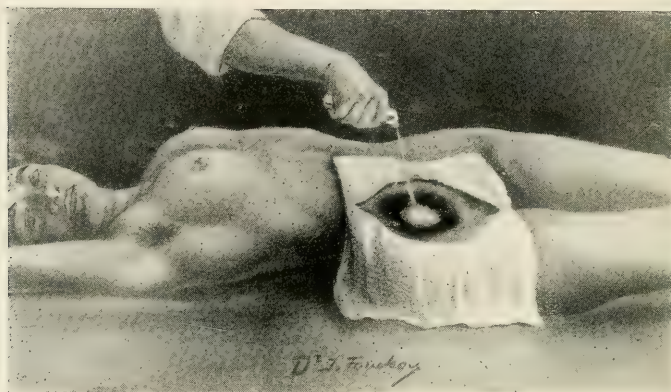


Fig. 111. — Where you see from periphery to centre : 1st the fenestrated compress surrounding the abscess zone; 2. a dark patch representing the skin painted with iodine, and 3. in the centre of the dark patch, a white area representing the part anaesthetized with ethyl chloride.

tion, after having smeared your fingers with tincture of iodine, or rubbed them well with benzole or iodized alcohol, touching the instruments only with the hands protected by compresses or large squares of gauze well sterilized (by boiling); or better still, with *fourreaux* similar to infants' gloves or "mittens", which have been prepared on the spot, by some one of the family, with two compresses stitched by three of their edges (v. fig. 108 et 109), and afterwards boiled.

b. Asepsis of the patient's skin. — Asepsis is produced nowadays by simple painting with fresh tincture of iodine, by means of a small brush or a piece of cotton wool (v. fig. 111), without previous washing or brushing. I should say,

without immediate washing, for a washing done the evening before can only be beneficial.

The tincture of iodine is allowed to dry for two or three minutes. Paint it widely.

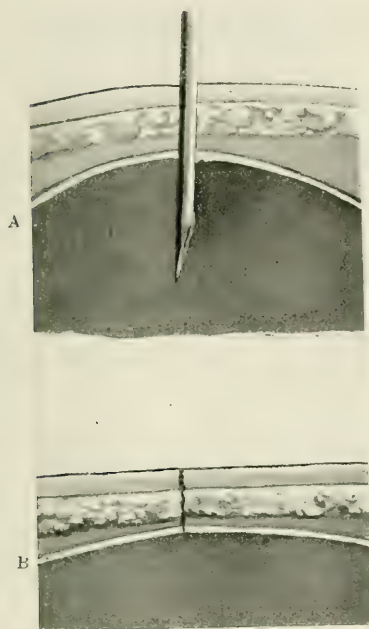


Fig. 112. — How not to puncture, for if you force the needle through the wall perpendicularly, its course through the soft tissues will be very short, the parallelism of the walls of the small wound would still remain when the needle is withdrawn; these conditions facilitate the infection of the abscess by pus, which may exude.

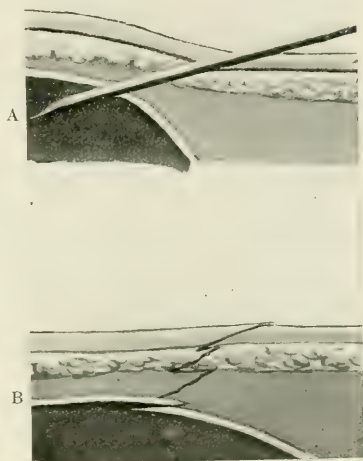


Fig. 113. — How one ought to puncture. The puncture is very oblique; the track is much longer (A); on the other hand, the retraction of the soft tissues does away with the parallelism of the sides of the wound, making a track « en chicane » (B).

that is to say, over a surface as large, at least, as twice the size of the palm of the hand.

The advantage of this extensive painting, is to prepare a place for the contact of the left hand, which has to fix the skin whilst the right hand pushes in the needle. For the same purpose, and as an additional precaution, a large (boiled) compress

is applied over the region, an opening being cut out of the centre, leaving uncovered a square of 6 to 8 c.m. wide, in the middle of which is the place chosen for the puncture. All the surface of skin left bare should be painted with tincture of iodine.

After the puncture, you remove, with a tampon impregnated with alcohol, what remains of the tincture of iodine, for if it is not very fresh it may cause desquamation or even vesication of the skin.

During the four or ten minutes required by the tincture of iodine to dry, you put in order the aspirator, that is to say, you make the vacuum, and you charge the syringe.

If you wait to make the vacuum until the needle has been forced in, you may have the pus spurting out and soiling everything, before the aspirator is ready. The aspirator and syringe are afterwards placed in a dish close at hand.

The puncture.

You use needle n° 3.

Where must you prick the skin? At a point away from any veins which are visible beneath the integuments, and at a distance of three or four c.m. from the cutaneous zone of the abscess, in such a way as to enter by an oblique track (instead of pricking the skin vertically and going straight into the abscess).

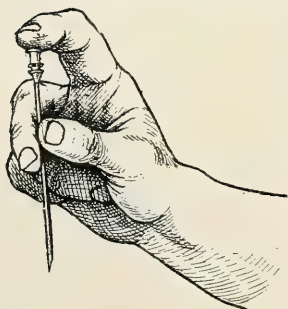


Fig. 114. — The needle is held between the thumb and second finger serving as guide, the first finger pushing on the head (or hold it as you would a trocar or writing pen).

This obliquity is advantageous for deep abscesses, and indispensable for superficial ones, especially subcutaneous abscesses (fig. 112). Those you should never enter except by a very oblique track and almost parallel to the skin.

Thanks to this obliquity (fig. 113) the lips of the deep extremity of the needle track will play the part of a valve and

prevent the contents of the abscess from escaping outwardly, as



Fig. 115. — Abscess of the right iliac fossa : the collection forms a thin sheet in the midst of the depressible soft tissues.

the needle is withdrawn. Moreover, in pricking the skin four

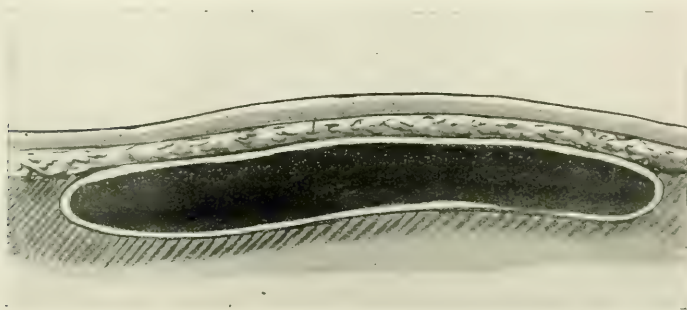


Fig. 116. — The abscess in the preceding figure. The sheet of pus very much spread out.

or five centimetres from the cutaneous zone of the abscess, one passes through sound skin; and that is very important.

Anæsthesia of the skin. — At the place thus selected (fig. 111) ethyl chloride is sprayed.

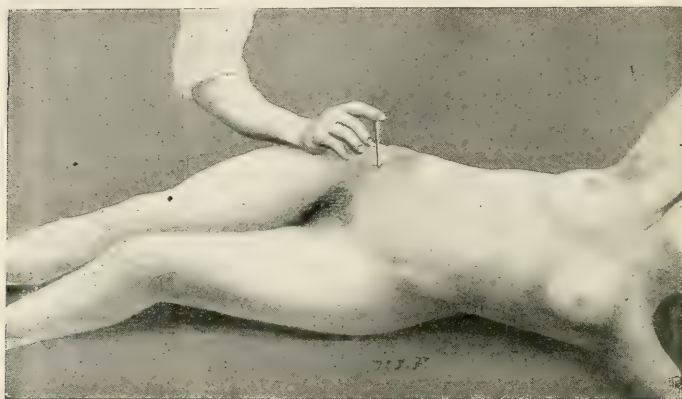


Fig. 117. — When you proceed to puncture the abscess, the needle depresses the skin before it enters the collection. Look at the following figure.

As soon as the skin is blanched over an area the size of a five shilling piece, take the n° 3 needle in the right hand

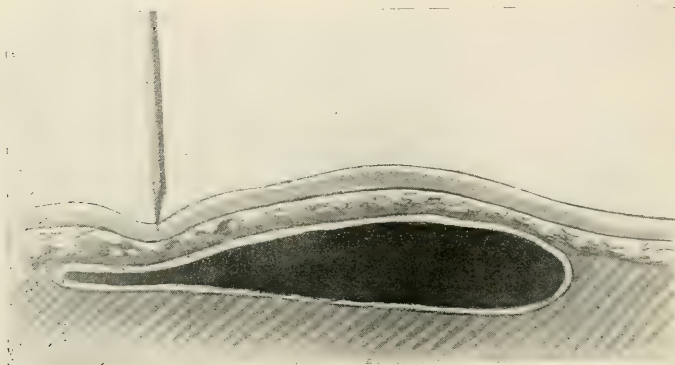


Fig. 118. — The pressure of the needle (v. fig. 117) drives aside the pus of which but a little, very thin sheet remains, liable to be traversed by the needle, without any result. This would be a « ponction blanche » (a failure), although a great quantity of pus is present. The index finger presses firmly on the head, then the skin is fixed by the index finger and the thumb of the left hand.

(fig. 114) and hold it by the middle between the thumb and second finger, whilst the index finger presses firmly on the

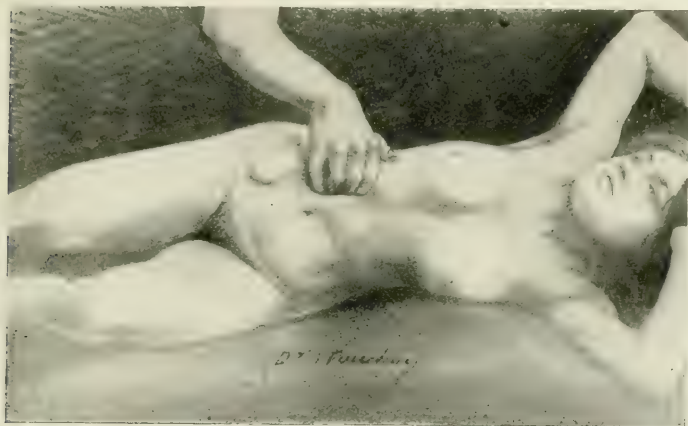


Fig. 119. — What it is necessary to do to puncture this abscess (see the four preceding figures). An assistant presses firmly on the periphery of the abscess.

head; then the skin is fixed by the index finger and the thumb

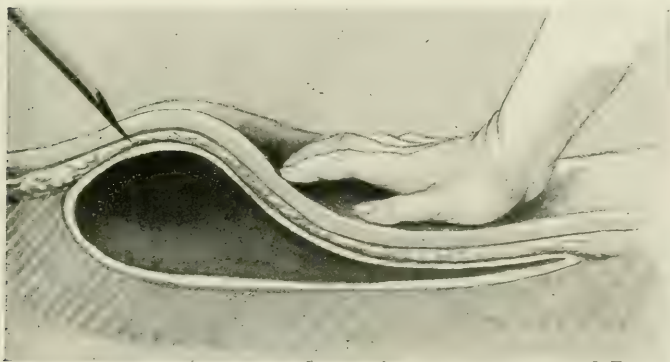


Fig. 120. — The assistant in this way (see fig. 119) causes the fluid to flow back to a single point where it should be easy to attack it with the needle, by an oblique puncture.

of the left hand at one or two centimetres from the point chosen for the puncture; you could, moreover, direct an assist-

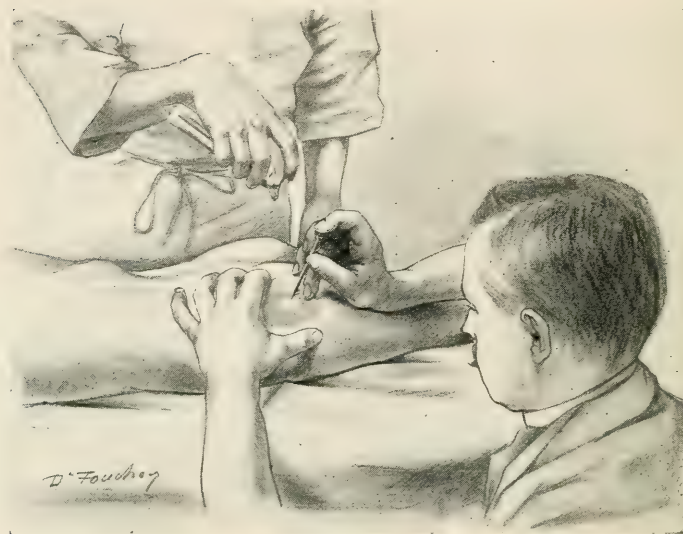


Fig. 121. — As soon as anaesthesia is obtained, you stretch the skin with the thumb and index finger of the left hand and thrust the needle with the right hand.

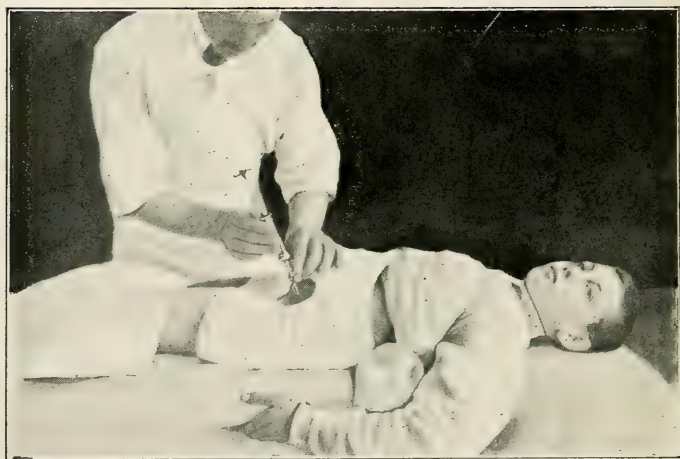


Fig. 122. — In order to adjust the aspirator to the needle, hold the outer end of the latter between the thumb and index finger of the left hand so as to prevent any displacement of the point. This adjustment once assured, the left hand opens the cock of the aspirator.

ant to push the abscess towards you, pressing it with one or both hands on the opposite part of the region; you then plant your needle in the skin, you push with a firm and sustained effort, so that the integuments are traversed.

The congealed skin is sometimes very difficult to pierce, and you need to push firmly; but it is necessary as soon as the skin has been traversed, to moderate your force, so as to

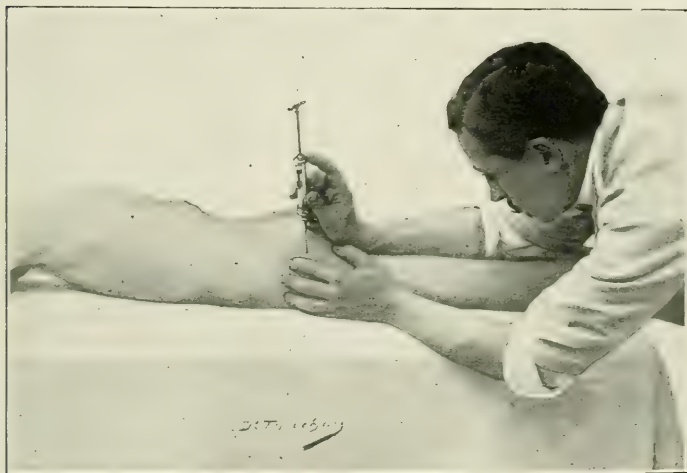


Fig. 123. — After that, still holding the aspirator and the needle in the right hand, the left hand presses gently on the abscess wall.

go through the soft tissues gently up to the point where you judge pus will be found.

When you arrive at the wall of the abscess, you usually feel a slight resistance; and you should press a little to get through; but as soon as you are in the sheet of liquid, all resistance has disappeared; you have a **special sensation**, which you at once recognise. You feel that the deep extremity of the needle moves about with a certain freedom, — which it would not do if it were not in the abscess itself.

Fairly often, a small drop of pus oozes from the end of the

needle. But, generally, the pus does not issue spontaneously; hence the evident necessity for aspiration, which is infinitely preferable, need it be said, to the rough pressing practised by some practitioners on the region of the abscess, to obtain the discharge of pus; traumatic pressures causing bleeding and creating the risk of inoculation — and, moreover, being very often ineffective in bringing about the evacuation.

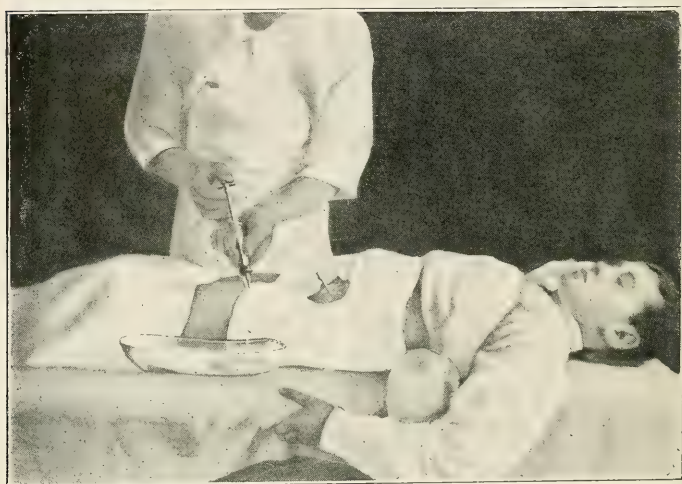


Fig. 124. — When the aspirator is full, the pus is emptied into a small basin.

You stop the needle with the left index finger, while the right hand takes from the basin the aspirator already prepared which is then adapted to the lumen of the needle.

When this adaptation is complete, the left hand opens the valve, the pus immediately fills the aspirator (held in the right hand); you then close the valve and withdraw the aspirator from the needle, which remains in its place. Before removing the aspirator you place and leave a small piece of sterilized cotton wool round the needle, to absorb any drops which may flow while you empty the aspirator.

You empty the aspirator, you exhaust it again and you

readapt it to the needle; and so on again and again, until the abscess is empty.

One recognises that the abscess is empty by its having collapsed; and, when it is superficial, by its cutaneous wall being deepened into a hollow, and by there being no longer any appreciable fluctuation.

Is it **necessary** to try and **empty** an abscess **thoroughly**?

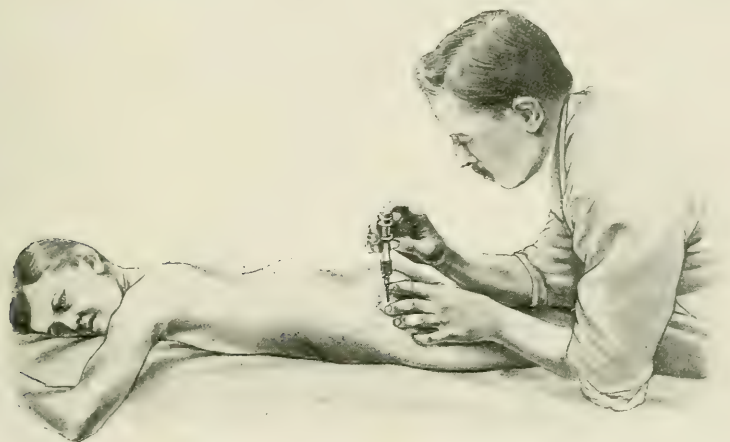


Fig. 125. — Injection. The aspirator is simply replaced by the charged syringe which is adjusted to the needle.

At the commencement of the treatment, no, so that you do not run the risk of causing the wall to bleed. Later on, after a series of injections, you may empty it thoroughly, because then, if you should withdraw a few drops of blood, that would cause no inconvenience, the pus being sterile at this time.

The abscess being emptied, one avoids washing the parts; it would be prolonging the operation uselessly, and even running a slight risk of infecting the abscess.

There remains to be done :

The Injection.

For this, you simply replace your aspirator by the syringe already charged, and you push in the injection.

We have indicated above the liquid which should be chosen : nearly always the creosoted oil ; and the quantity which should be injected : for large abscesses, never more than from 10 to 14 c. c. ; and for small abscesses inject less than 10 c. c., using a quantity equal to a half, or a third of the quantity of pus withdrawn.

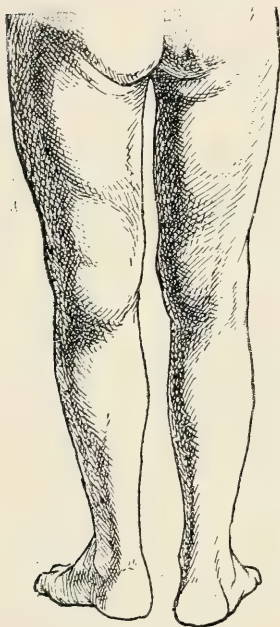


Fig. 126. — Abscess of the left popliteal space.

Withdraw smartly the needle attached to the syringe.

Immediately, you place over the orifice a **tampon** of wool or a piece of sterilized gauze, and, by a few to-and-fro movements, you do away with the parallelism of the two orifices in the skin and the abscess wall.

Finally you apply lightly a compressive **dressing**, in place of the simple layer of collodion usually employed, which does not sufficiently guarantee against infection. And do not touch it again for several days, until the second puncture.

When should the second puncture be made?

This varies a little, according to the case. It is best made after **about ten days**.

Why this delay? Because at the end of that time the liquid injected has ceased to act. — This rule applies to ordinary cases, where the skin, before you puncture, was in very good condition ; for if the skin were inflamed and attenuated, you must inspect it next day, and every following day, to watch it and guard against all eventualities which we will mention a little further on.

In ordinary cases, where the skin was in good condition (neither reddened nor attenuated) it is useless to examine it before

the tenth or twelfth day; at that date, a new puncture is made, followed by an injection. The skin is pierced at a new place

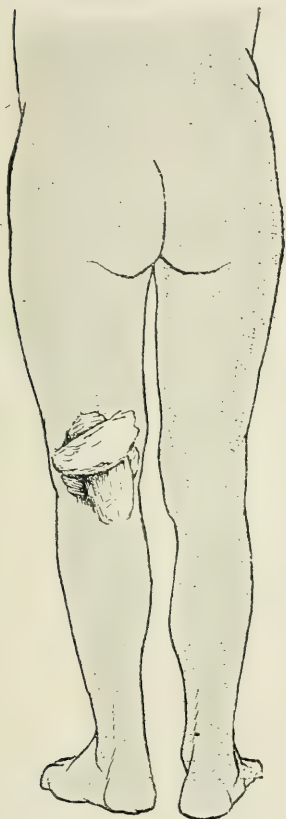


Fig. 127. — Squares of absorbent cotton wool damped and arranged for the compression of the abscess on the completion of the series of punctures.

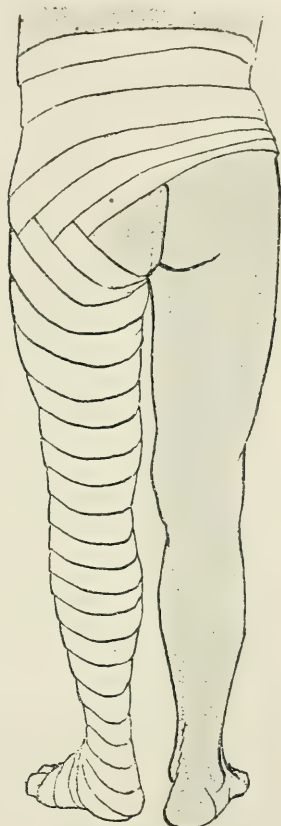


Fig. 128. — Compressive bandage beginning at the toes and reaching far above the abscess for the purpose of causing approximation of the walls of an abscess of the thigh or of the groin.

on each occasion, so as to avoid all risk of a fistula occurring.

It is preferable to make the second puncture about the twelfth day than to postpone it indefinitely, relying upon the re-absorption of the abscess, a possible occurrence, after a

single injection. — Our reasons are analogous to those which have urged us to puncture rather than abstain, namely, that re-absorption does not often occur, that in waiting one loses time, and supposing a case in which this single injection would suffice, the abscess would not be so well cured as it would be

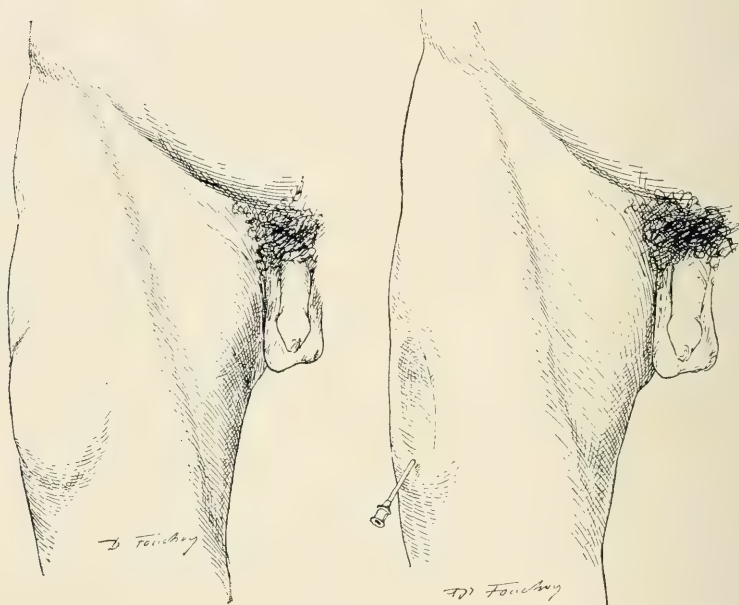


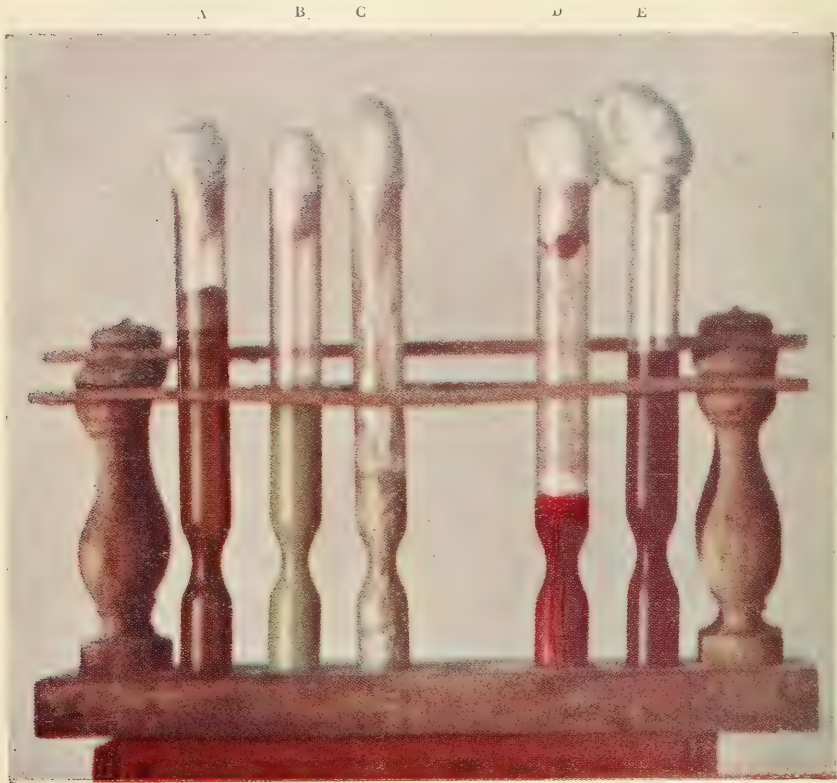
Fig. 129. — Abscess of the external aspect of the thigh.

Fig. 130. — The same abscess after puncture and complete evacuation: the globular swelling is replaced by a saucer-like depression.

after 7 or 8 injections. In the same way an abscess treated by injections will be better cured, as we have said, than that which has re-absorbed spontaneously, without any injection.

As to the length of the intervals between the sittings, I know very well there are all manner of opinions; on the one hand are practitioners who propose to repeat the operation every three days; on the other hand there are others who consider the interval should be three months. Well, I consi-

THE DIFFERENT APPEARANCES OF TUBERCULOUS PUS

(AND THE INDICATIONS TO BE DRAWN FROM THEM AS
REGARDS TREATMENT AND PROGNOSIS)

Cliche J. Fouchou.

A. B. C. *Non infected pus* : Treatment by punctures and injections.

A. Serous pus, mahogany colour : } In these 2 cases inject iodoformed oil
 B. Ordinary pus, yellowish green.. } or ether.

C. Clotted pus. — In this case inject camphorated naphtol.

D. *Sanguineous pus*, without fever, without the odour of pus. — This abscess is not infected but runs a great risk of becoming infected and of bursting. To avoid this twofold danger, punctures must be performed *as rarely as possible*, without injections, with slight compression afterwards; by « as rarely as possible », I mean that punctures are to be made only if the skin threatens to give way.

E. *Claret coloured pus*, infected, with fever and the odour of pus. — Treatment : Try to reduce infection and fever by puncturing every day without any injection afterwards. If after 15 or 20 days fever still persists in spite of the punctures (without injections), resign your self to incising and draining this abscess.

der the truth lies between the two. If the sittings are repeated too often, there is a risk of the skin « deteriorating » and of infection — and beside it would fatigue the patient. If they



Fig. 131. — This is the end of the 8th and last puncture; this time, instead of a further injection, you apply compression.

When the evacuation is finished, you apply over the abscess a pad of cotton wool moistened and squeezed out; the left hand resting on the pad, the fingers are applied successively the one after the other, commencing at the part furthest removed from the point where the needle entered, causing the last few drops of pus remaining to flow in that direction. The aspirator and needle are then withdrawn together, smartly.

are too far apart, the cure of the abscess will take a very long time, and a perfect result is not so certain. Therefore, neither



Fig. 132. — Then over all a flat tampon and, to perfect the compression, some moistened pads of cotton wool placed crosswise over the abscess.

too long, nor too short, — and the best rule is to make a sitting every 10 or 15 days.

At the seventh puncture, the liquid you withdraw is no longer pus, but a mixture of brownish serosity and

of modifying liquid sometimes slightly tinted of a rose colour. Very often also, at this time, one notices in the con-

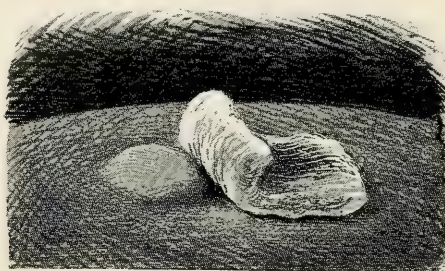


Fig. 133. — Two or three weeks after, you remove the compress and make an inspection. If, as shewn here (but it is an exception) a small quantity of pus still appears, it is collected at a single point instead of being distributed over the whole wall of the abscess. Puncture at this point without removing the pad of wool, which should remain in position after the puncture, and over it replace the tampons cross-wise so as to renew the compression which should be maintained evenly for three weeks.

tents of the abscess, some of the **liquid injected, unaltered**¹.

If, after seven punctures and injections, liquid is again

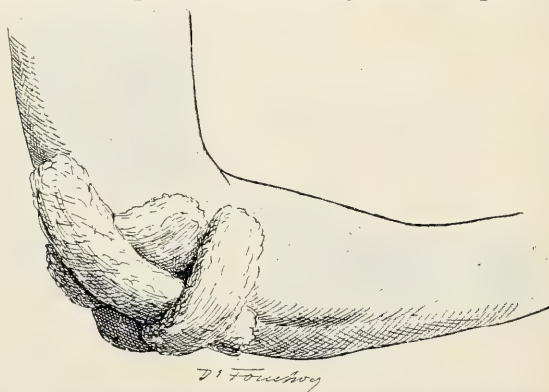


Fig. 134. — The disposition of the moistened tampons for compression of the culs-de-sac about the elbow.

1. The bacteriologists explain this (refer to p. 127), by saying that at the **beginning**, as a result of the first injections, a **lipolytic ferment** is formed, having the property of **digesting fatty matter** (such as the oil of our injections); a little **later**, a **proteolytic ferment** appears, which digests albumenoid substances, but **leaves intact the oil** of our solution.

formed, which is the rule, you will make an eighth puncture, but this time **without injection**.

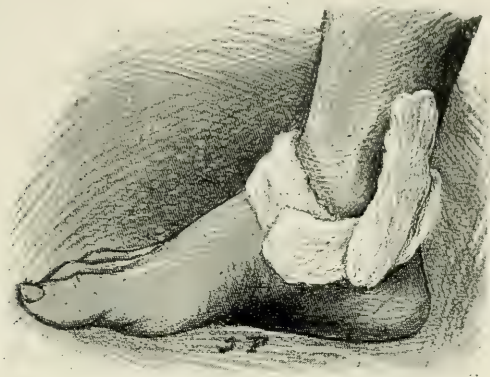


Fig. 135. — Compression of the cul-de-sac of the instep.

And you will at once **compress** the region with pads of

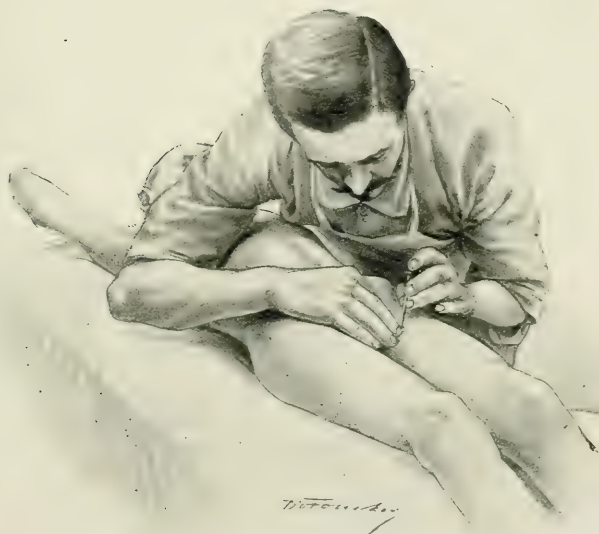


Fig. 136. — To avoid the vessels, they are marked out by the index and second fingers of one hand and pushed on one side, while the other hand pushes in the needle two centime'tres outside them.

wool placed cross-wise, and Velpeau bandages, to promote the **approximation** of the abscess wall, from that time sound and secure (fig. 131. 132. 133. 134. 135.).

This compression you maintain, and even if possible increase, by adding every four days one or two Velpeau bandages over the compressive dressing (without undoing it).

This dressing remains in place for from 15 to 20 days.

When you eventually remove it, approximation of the walls of the pocket has been effected; the abscess is cured.

Nine times out of ten this will be the course of events; very regularly, without incident, without a slip.

The tenth time, certain incidents may arise which would disconcert you perhaps, if you were not fore-warned; but you may easily overcome them, after having read the following chapter, which may be entitled : —

Possible incidents in the course of punctures and Injections.

A. — IMMEDIATE INCIDENTS.

which may happen even in the course of puncture.

We will particularise these : wounding of arteries, with the means of avoiding it; what should be done in case the puncture proves negative; when it causes bleeding; when the cutaneous orifice is obstructed by granulation tissue, after the needle is withdrawn; the course to adopt when the patient comes to you, the skin being already inflamed and attenuated, ready to give way.

1. **Wounding of vessels.**

Abscesses are sometimes found embracing veins or arteries of some size; how do you avoid wounding those vessels? It will be very simple — after you have cast your eyes over the figures opposite and read their descriptions. (fig. 137, 138, 139, 140).

2. **The puncture is negative** (no pus flows).

The needle is introduced, aspiration is made, nothing appears.

Why? a) It may be due to the **faulty working of the aspirator**. Make sure that you have really made a vacuum by drawing into the instrument a little boiled water from a basin). If a vacuum has not been produced, you should tighten



Fig. 137. — How to protect the vessels in the case of a small abscess lying over them (in the fold of the groin).

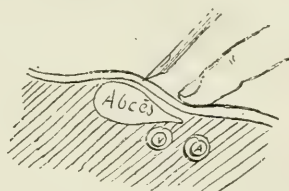


Fig. 138. — The abscess is pushed forwards by pressure of the finger. The needle pushed in at an angle, does not risk injuring the vein.

the two screws which serve to regulate it. and aspirate again. But the pus still does not flow.

Look for another cause.

b) **Are you certain you are in the abscess?** neither to one

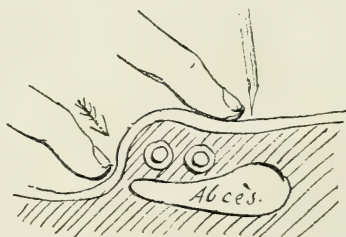
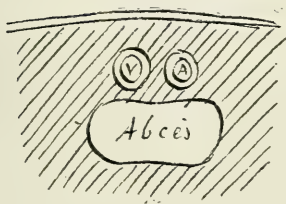


Fig. 139. — An abscess situated behind the vessels.

Fig. 140. — A finger is pressed firmly on the skin on the inner side of the vein in the direction of the arrow. The abscess is made to protrude on the outer side of the artery : a second finger protects the artery during the puncture.

side nor to the other of it? In order to know this, you proceed, whilst an assistant holds the aspirator, to make a fresh palpation of the neighbourhood, and ascertain if the level of the abscess corresponds exactly with the point of the needle.

When in doubt, push in or withdraw a little the needle

coupled on to the aspirator, you will move about within the vacuum in the neighbouring parts.

But if the pus will not flow at all, it is because :

c) Your needle is blocked.

Generally one feels at once that the needle must be blocked : because one has the sensation, very plainly, of penetrating into a layer of liquid, or because one has already withdrawn a little of the liquid, when all at once the flow is stopped — in spite of the fact that one feels quite well that the abscess is not yet empty.

What can you do to **clear the needle**?

There are practitioners who would, even in this case, press very firmly on the abscess, to evacuate the engaged clot : a **bad manœuvre** which would cause bleeding and bring about inoculations, — the least inconvenience of this method being that it is nearly always useless.

You must, **on the contrary, drive back the clot** into the abscess. To do that, you replace the aspirator by the syringe, and force vigorously into the needle 5 or 6 gr. of creosote oil with iodoform, or, better still, of sterilised water ; after that withdraw the syringe and replace the aspirator, and you will see the flow return.

If the needle become blocked a second time, you might force in a new injection or introduce into the mouth of the needle the metallic brush (fig. 106) of which the length is calculated so as not to pass beyond a few millimetres of the extremity of the needle.

If it is constantly being blocked, **do not give it up**, do not be unnerved, and, above all, **do not imitate** those impatient surgeons who immediately cut into the abscess, which « refuses » to be emptied.

Too often, this fault, committed with a light heart, would be irreparable : the fistula produced **would never close**. No. Content yourself with **injecting** 3 to 6 gr. of **naphtol-camphor with glycerin**, then remove your needle, putting off the puncture for three or four days.

During these few days the naphthol-camphor will have had time to soften the abscess contents ; this time you will obtain pus. If, for some extraordinary reason, you still do not obtain it, you should again inject naphthol which will at last produce a liquid capable of being evacuated, if not by needle N^o. 3, then by needle N^o. 4, which you would be justified in using under the circumstances.

3. There is bleeding. — You draw blood with your needle as soon as it is introduced.

a) If it is at the **commencement** of the puncture and there are merely a **few rosy streaks** in the midst of the liquid, that is nothing ; **continue** to aspirate without fear, and you will notice that at the second aspiration, no more blood is obtained, but only pus.

b) On the other hand, if **immediately** the needle is introduced, a jet of blood escapes, you may be certain that you have struck some small vessel of the wall of the abscess or of the surrounding soft parts : it will be better to **withdraw** your **needle at once**, then apply **pressure** for a few minutes with a large tampon kept in position by the hand, after which you apply a compressive dressing, postponing the puncture and injection until the next day or the day after, unless it is necessary to empty the abscess immediately, in which case you will puncture again, choosing another place for the introduction of the needle.

c) **At the end of the puncture**, after having emptied the abscess, if you see that the pus is slightly tinged with blood, the evacuation **is sufficient**, make haste to withdraw the aspirator, push in the injection, and withdraw the needle. Here again, you apply pressure for several minutes, then you apply the compressive dressing.

In all cases where the abscess has shown traces of blood, do not be surprised at obtaining at the following puncture, some blackish or grayish brown fluid. it is only a mixture of pus and altered blood.

But now and then at the time of the puncture you withdraw a liquid of reddish or chocolate colour sometimes blackish, which is blood more or less altered. You know that this is from the pocket of a cold abscess (and not from a simple

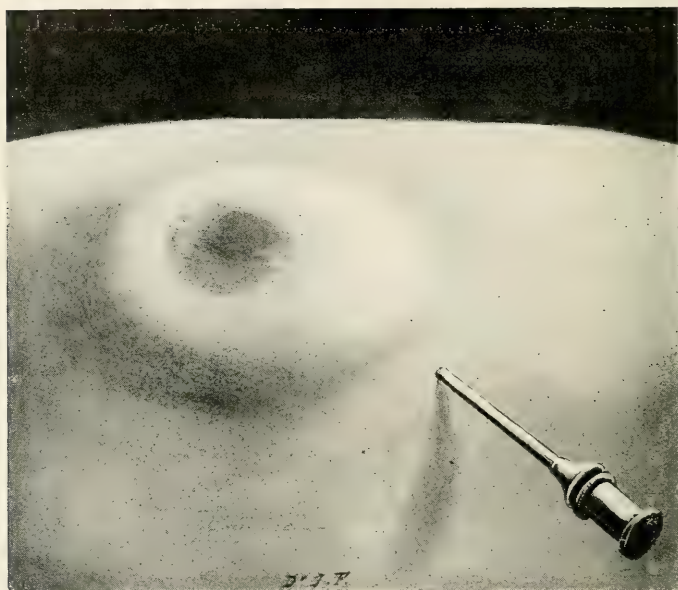


Fig. 141. — The skin is thin and inflamed at one point. You will puncture by entering the needle well away from the cutaneous zone of the abscess.

traumatic hematoma), by its situation near an articulation or near a bone certainly tuberculous.

It will be necessary to empty the abscess but without injecting anything at once, and to apply a firm dressing; — after that you will wait 4 or 5 weeks, and even longer if possible, that is, as long as the condition of the skin will permit, before again performing a puncture.

4. The cutaneous orifice is obstructed after removing the needle, by **a drop of pus or some granulation debris.**

After having withdrawn the needle, you may see a drop of

COLD ABSCESS READY TO BURST

HOW TO SAVE THE SKIN? (See explanation below illustration)



On her arrival at Berck this girl had a cold abscess ready to burst; skin already red and very thin. In this case, to save the skin we made punctures every day or every other day (without consecutive injections), during 2 weeks. On the 15th day the skin was saved, as can be seen in the next plate (pl. III).

THE SAME (see pl. II). THE SKIN IS SAVED

(SEE EXPLANATION BELOW THE FIGURE)



The same child as on plate II, after 15 days of treatment (puncture nearly every day, without injection). One sees here that the skin is saved, it has regained its normal colour. From this time, we made punctures and injections, i. e. the usual treatment for cold abscesses.

pus, or some caseous particles or other debris from the abscess wall, appear in the opening. You should **remove the debris** with a tampon and wash the part with great care, so as to avoid all possible inoculation of the skin.

After all, this little incident rarely occurs if you use only a fine needle, N° 3, for puncture, and if you only approach the abscess by a long and oblique track, and finally if, in the case of aspiration without injection, you take great care to close the valve before withdrawing the needle while joined on to the aspirator; if you do not, the vacuum still remaining will draw the clots up to the orifice in the skin.

5. Incidents arising from the bad condition of the skin when the patient is first seen.

The skin is **reddened** and **thinned** when **first seen**, this means that the deep surface of the skin is already inoculated and invaded by the tuberculosed wall of the abscess.

Can you save the skin? Yes and no.

It is not *always possible* and it is on account of this that it is not permissible for the practitioner who has the patient under observation from the outset, before any alteration in the skin has occurred, and who has the choice of the moment for intervening, it is not permissible, I say, to postpone the first puncture beyond a few days.

But if nothing is neglected this skin **can** oftentimes, even **most generally**, be **saved**. At any rate this saving of the skin must always be attempted; the first condition in order to attain this object, is to desire it. Now, most of those who are in favour of puncture and injection believe as soon as they see the skin already red and thin, that the battle is lost beforehand; they will not even attempt a struggle. Worse still, they at once take the knife and freely open the abscess, judging that a surgical opening is better than a spontaneous opening. Foolish policy!

This is quite wrong, there is no reason ever to despair of saving the skin, even when most compromised; especially is it

never advisable to use the knife; it is ten times preferable to fold one's arms : if you do not touch the skin at all, it preserves at least a slight chance of saving itself.

Unhappily, as to this, practitioners are very difficult to convince, I repeat it, and it happens every day that they, who say that they accept the method of puncture, open cold abscesses or tuberculous suppurations, judging that « in this particular case » (??), which they have had under their eyes, the skin is already too attenuated and too inflamed to allow of their abiding strictly to the rule.

Nay, this rule does not admit of exception. One must always endeavour to save the integument, and one will often be successful.

We have cited a number of facts in support of that which we advance here (see my book *Les maladies qu'on soigne à Berck*, p. 120, Masson, éditeur).

How to save skin which is compromised?

There are two indications to fulfil :

The first is to **do away with all tension** of the skin which is so attenuated and offers so little resistance, and, for that, to puncture the abscess every day; the second is to prevent the march of invasion of the tuberculosis, which calls for **injections**.

But are not the two indications contradictory? If injections are made, secretion by the wall of the abscess is encouraged and the abscess refills; but without injections, the tuberculosis is not arrested in its march, it will finish by destroying the skin.

What is to be done? There is an alternative.

It is to puncture the abscess every day, or every other day and then to inject only a very small quantity of iodoformed creosote oil; $1/2$ to 1 c.c. for small abscesses, 3 to 4 gr. for large ones. Thus, you inject sufficient liquid to modify the granulations on the deep surface of the skin, but not enough to excite a hyper-secretion from the abscess wall, which would still further lessen the vitality of the skin.

In such a case do not neglect, especially if dealing with an extensive abscess, to place the patient in such a position that the inflamed part of the skin is uppermost; when necessary make the patient lie face downwards, may-be for several days and several nights. He soon becomes accustomed to this position, which gives us, in many cases, the best results in helping to save a skin ready to give way.

And as soon as the skin has been undoubtedly saved, return to the ordinary treatment of the abscess by puncture and injection, going up to a series of seven injections, the regulation number.

B. — CONSECUTIVE INCIDENTS.

to one or several punctures or injections.

There is the skin, the resistance of which becomes lessened in spite of, or even on account of, treatment. There is the abscess which does not dry up, or which becomes infected, or which bursts open, in spite of everything.

a) The **skin becomes red and thin** after one or several sittings. One has established that, after each puncture and injection, the abscess refills and before long the increased tension in the abscess creates a danger to the skin. This hyper-secretion from the wall is due to an excessive reaction caused by the injections. Discontinue them then, for a while, but continue the punctures, without waiting for the 10 to 12 days interval (v. p. 145.).

Repuncture, were it the day after the preceding puncture, and puncture again every day (without injecting anything) until the red and thin skin has recovered its resistance and its normal colour.

At this moment you start the injections again, if the patient has not had the regulation number, but taking care this time, that you inject only half or a third of the dose used before, or make only one injection for two or three punctures.

b) **The abscess does not dry up.**

After having continued the punctures and injections for

two or three months, the abscess continues as large as at the commencement of the treatment.

This persistence of the abscess is due, most often, to the fact that **too many** or **not enough** injections have been made. It is to avoid this double stumbling-block that it is necessary to go up to the number of 7 or 8 injections, but not to exceed that. If it is a mistake to keep to one or two injections, it is a mistake also to continue the injections as long as the abscess reappears; it may happen that, for a few days after the injection, the liquid does not reform, that is the exception; **most often**, the liquid **reforms as long as you continue the injections**.

Yes, even after the wall of the abscess has been thoroughly cleansed, a fresh injection of the modifying liquid, always a little irritating, sets up a secretion of serum from the wall — amicrobic — a secretion which may persist indefinitely, if injections are continued indefinitely.

The injections should be discontinued after the seventh or eighth, and from that time make only one puncture *without injecting*, then a compression in the manner described, to effect the approximation of the refreshed wall.

If, after two or three weeks compression, fluctuation can still be felt, puncture again and recommence compression and continue it for three weeks longer.

At the end of that time, examine again. If the abscess persists with the same volume (or practically the same), empty it again and make compression again for a third period of like duration. The abscess should now be dried up. If it is not so it is, in this particular case, because the wall of the abscess has not been sufficiently modified by the regulation number of injections.

Then you must begin again a complete regular treatment, that is a second series of punctures and injections — after which, a last puncture without injection and compression. But, not oftener than once in ten times, will you be obliged to make thus a second series of punctures and injections, and

not oftener than once or twice in a hundred, a third series. On the condition however that the general state of the patient is not too bad, and that the local treatment of the causal lesion of the abscess by gravitation is not too defective. For, one or another of these causes may, in fact, prevent the cure of the abscess.

Thus, for example, you may have followed an unimpeachable local treatment of the abscess, the abscess will nevertheless go on for ever, if the patient be cachectic, or presents multiple tuberculous foci.

Or again, if you do not look well after the **original condition** which has caused the abscess (hip disease, Pott's disease, white swelling); if, for example, you do not put those patients into a position of absolute repose, if you allow them to walk about, and if you do not immobilize them with good apparatus, the abscess by gravitation runs a grave risk of never drying up.

And this can be seen in certain cervical adenites; the abscesses persist as long as the bad condition of the mouth and of the tributary territories of the glands causing the abscess continues.

And from that the treatment can be guessed. It is to **suppress the causes** which are producing the suppuration, to seek for every means that will ameliorate the general condition of the patient, to prevent walking, to immobilize him with a good plaster, to remove teeth which are decidedly bad or not absolutely sound, etc.

c) Infection of the abscess occurring in the course of treatment.

May we hope that after our numerous recommendations, no one will ever make a mistake in asepsis in the course of puncture and injection? and that you will always know how to avoid infection of the abscess,

Alas, no? *Errare humanum est!*

It is necessary then to give here a sketch, a symptomatic table (to which we shall return), of super-added septic infection.

The most important sign of infection, is the appearance

of **evening fever** with marked **morning remission**. And this fever is accompanied by the general phenomena with which we are familiar: loss of appetite, rapid wasting, insomnia.

There are also local changes in the abscess and in the parts around.

These local changes present themselves under two different aspects :

a) Sometimes, they present a rapid transformation from a cold abscess to an acute phlegmon; there appear redness, heat, local swelling, and pain, either spontaneous or on pressure. Before long, the inflamed skin tends to ulcerate and give way at a point whence issues a thick, phlegmonous, viscid, microbe-laden pus, which must not be mistaken for the non-microbic pus of an abscess produced by our solvent injections, or by oil of turpentine when one wishes to produce a stationary abscess. Here are the means of making a diagnosis; in the aseptic abscess, the temperature falls under the effect of repeated punctures not followed by injections, in the septic abscess the temperature does not yield until after the opening and draining of the abscess.

b) The other case is where there are little or no appreciable changes in the skin: it applies generally to deep abscesses; at the same time, the general phenomena predominate, but the contents of the abscess has changed; it is no longer true pus, but a *sanguinolent* liquid, the colour of *tomato or of wine lees*; it contains sometimes gaseous bubbles and often exhales a fetid odour.

Treatment. — One endeavours, by means of daily punctures (without injection), to make the temperature fall. — If the infection is very slight, one can do this. It is rare, but I have seen it; then, attempt it.

If, **in spite of punctures** made nearly every day for a certain time — fifteen days, for example — **fever persist**; if moreover you are certain that the fever is not to be attributed to any intercurrent malady or to a visceral localization of

tuberculosis, then, recognise that you have no alternative but to open the abscess. Accept the inevitable.

You must know also that you should not delay the opening, for if you wait too long, the liver and the kidneys run the risk of becoming infected, and that **visceral infection** will be

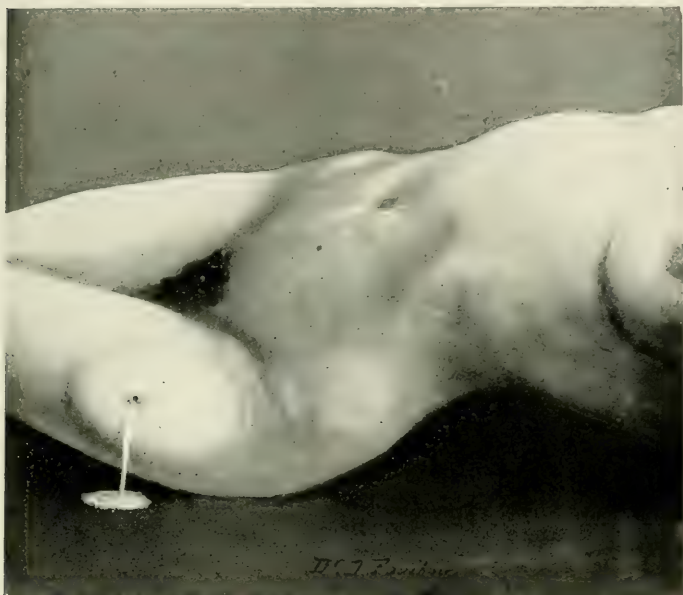


Fig. 142. — The skin very much stretched by pus causing it to give way at a point.

capable, later on, of spreading on its own account, even after the abscess has been opened.

Therefore, if after 15 or 20 days, the phenomena of infection and fever have not disappeared, resign yourself, **open the abscess** and **drain it well**. And you will behave afterwards, as you would in dealing with an infected fistula.

Are there not abscesses **infected from the very outset**, infected before having been interfered with?

Yes, but exceptionally, in the two following cases ;

First case. — That of an iliac or lumbar **abscess** of **Pott's disease**, which may, strictly speaking, be infected at the outset by the contiguity of the intestine, fissured or not.

This may happen perhaps once in a hundred times, and even here, in these abscesses, the infection, when it exists, comes, 99 times out of a 100, from without, from a fault in the asepsis, or from a fissure in the skin.

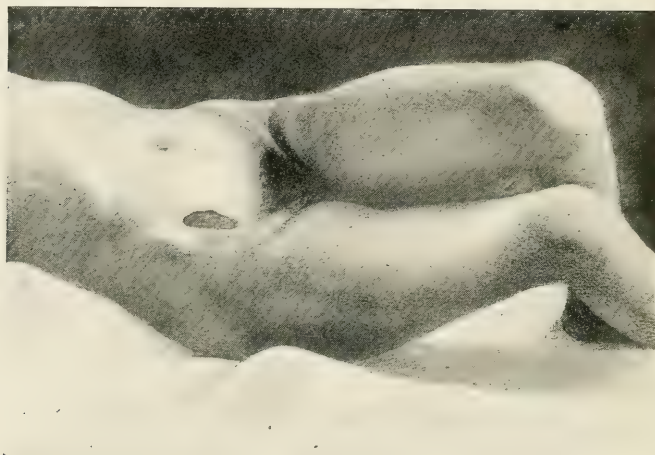


Fig. 143. — The abscess has opened extensively. A patch of skin has given way.

The signs of infection and its treatment are the same as those given above.

Second case. This relates to suppurative **adenitis** in the **neck**.

When there are bad teeth, erosions of the pharynx, or of the ears, or of the nose, or of other tributary territories of the cervical glands, one cannot be sure of being able to prevent, with certainty, the rupture of the skin near a tuberculous abscess, because then, in many cases, it is no longer a question of tuberculous abscesses, but of abscesses infected, little or much, by septic germs coming from without.

Therefore, here again, make some reservations as to the chances of saving the skin, if you have seen ulcerations of the

pharynx, teeth bad or not absolutely sound, etc. The infection may be then grave enough to lead to a bursting of the skin, and at the same time, not sufficiently so to cause fever, or at least a fever of more than a few tenths of a degree.

d) Spontaneous opening of the abscess.

We have mentioned above the case where the rupture of the skin was threatening. Imagine the case, still more unfavorable, where the opening has been produced at the moment of the patients arrival, or a little before, or even before your eyes, in the course¹ of treatment, after one or several injections.

What is to be done?

Here again, try and **retrieve** the condition of things. Instead of enlarging the opening, as alas! so many surgeons do, you should do everything possible to close it. — and you will generally succeed.

You will succeed especially when the opening has not taken place until after a certain number of injections, because then the deep part of the abscess has had a good chance of being so modified and refreshed that the cicatrization may be brought about regularly and quickly, from the deepest part to the periphery, (the small superficial wound being, in this case, no longer nurtured by the abscess). The chances of success are decreased, one can understand, if no injections have yet been made, but you may still succeed here very often.

How?

1. For, in fact, it may happen (and though the case be rare, I ought to mention it) that, in such patient, even when seen in time, **with skin still sound**, even treated regularly, and without there having been **any fault committed in the technique**, it may happen that the tuberculosis is, in this case, particularly malignant, that it has been impossible to arrest its progress towards the skin, and that the skin gives way; the abscess is open, a small fistula has been produced. But, be re-assured, such evil cases, tuberculosis so malignant, are scarcely ever met with, say once or twice in a hundred cases.

It still remains true that with good general treatment and punctures well performed, you may promise a cure of abscesses « without a hitch ».

By simple methods;

This, for tuberculous wounds; daily dressings, thoroughly aseptic, or applications of various topical remedies, tincture of iodine, oxygenated water, permanganate of potash, naphtalan, Championnière powder, our own powder, a drop of lactic acid, iodoformed oil and creosote, Vigo plaster, néol, etc.

Take care to change the remedy nearly every day, for 2 or 3 weeks. Here is the formula of our powder :

Aristol	40 grammes.
Subnitrate of Bismuth.	100 —
Grey Quinine, pulverised	300 —
Siamese Benzoin, pulverised	300 —
Carbonate of Magnesia	300 —
Oil of Eucalyptus.	30 —

After 2 or 3 weeks :

Either cicatrisation has been accomplished. In that case, if the abscess is no longer perceptible, the treatment is finished. If the abscess persist, you will treat it by punctures and injections, after having waited a few days longer, to give the skin time to strengthen itself.

Or else cicatrisation has not occurred, nor anything like it, that is the small wound is kept open by a persistent abscess; it can be closed only by dealing directly with the abscess. For this one makes in the track, and in the cavity of the abscess, some modifying injections, either in liquid form, or in the form of paste.

The medicated agents are the same as for the treatment of a cold abscess.

If injections of creosote, of iodoform, of naphtol camphor with glycerine, cure the tuberculogenous wall of a closed cold abscess, it is not logical to demand of those injections the cure of the tuberculogenous wall of open abscesses, of cavities, or of fistulous tracks; the anatomical and bacteriological constitution of the wall is identical in both cases, so long as they have not been penetrated through the open orifice by septic germs entering from the exterior.

Nevertheless, even when not infected, the open abscess is not in the same condition as the closed abscess, its cure is not so easy, for two reasons;

The first is that the open abscess constantly runs the risk of infection.

The second is that the injected liquid being not retained, returns immediately — without having time to modify the wall of the abscess. Compare with this case that of a closed abscess, where the injection is acting day and night, for several weeks.

Fortunately, we are able to put an end to this double difficulty; 1st, by means of a very *severe asepsis*, we can prevent, at least for a certain time, the entry of septic germs from without.

2nd. In the second place, the modifying liquid may be retained in the sinus and in the cavity. This result is obtained by closing the orifice (immediately the injection has been pushed in), by means of a conical **plug** of sterilised wool **introduced into** the opening, or more simply by a **small tampon** (of wool) **applied over it**, and pressing on the cutaneous lips of the fistula, — the plug or tampon being held afterwards by a few turns of Velpeau bandage.

3rd. If you do not succeed in keeping the liquid in its place by this method, there still remains the employment of the **same medicaments in the form of paste**.

These pastes are liquified (by warming to 45° or 50°) a short time before injection, and they solidify at the temperature of the body very soon after being injected.

We will return to the details of this technique a little further on, *a propos* of the treatment of fistulæ not infected (v. p. 170 and following).

The cure of the cavity of the abscess and of the sinus will lead to that of the small cutaneous fistula which they keep up, and cure is the rule in the recent fistulæ of which we are now speaking, occurring in the course of treatment (by punctures); for there is here as yet no infection or hardening of the track.

The cure is consequently, much easier to obtain than in old fistulæ.

II

THE TECHNIQUE OF INJECTIONS IN THE DRY OR FUNGATING TUBERCULOSES

We will describe elsewhere, in the chapters devoted to *cervical adenitis*, *epididymitis*, *white swellings*, *osteitis*, etc., that is, *a propos* of each dry or fungating tuberculosis, in which cases the injection ought to be made.

Here, we will only describe the technique of the treatment.

TECHNIQUE OF THE INJECTIONS

A. Instrumentation.

- a) The syringe, of ordinary glass (v. p. 121).
- b) Needles N^{os} 1 and 2; Number one for very fluid liquid, number two for more viscid liquids.

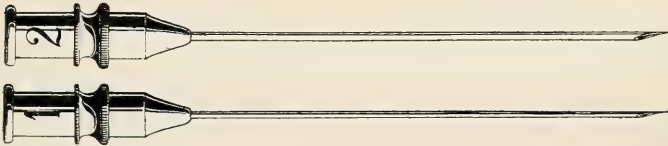


Fig. 144. — Needle n° 1.

Fig. 145. — Needle n° 2.

B. The liquids.

These are the same, in a general way, as for cold abscess, namely;

- a) The mixture of creosote, oil, and iodoform, which is « hardening » in its action.

b) The mixture of naphtol, camphor and glycerine, which is « softening ».

Very much the same doses are used here as in the treatment of cold abscess.

There is another softening agent, 5 or 6 times as active as the naphtol camphor and glycerine; it is a mixture of equal parts of the four following liquids: sulphoricinated phenol, camphorated phenol, camphorated naphtol, spirit of turpentine. We will describe the indications a little further on, p. 168.

The Technique

One endeavours to effect, either *the hardening* of the fungosities, or their *softening* (after which one will puncture them)¹.

a) *To produce hardening*, inject the mixture of oil, creosote and iodoform (the dose from 2 to 8 gr. according as the patient be infant or adult); make the injection in the centre of the fungating mass, and, in the case of arthritis into the joint cavity itself.

Repeat the injections every six or seven days up to a maximum of 10 injections.

Then, compress the region with pads of cotton wool kept in position by Velpeau bandages.

Note that the hardening looked for is not produced either during the period of the injections, nor immediately afterwards. *On the contrary*, the injected parts *swell* during that time; this *you must warn the parents of*.

It is not for three or four weeks after the tenth or last injection, that the fungosities commence to diminish in size; and it is only 3 or 5 months after ceasing the injections that you will observe the disappearance of the tuberculous masses.

1. This idea of the softening of hard tubercloses, for their subsequent puncture, appears now quite natural. But when we first proposed it some twenty years ago, anathema was thrown at us. Just think: « To want to cause tubercloses to suppurate!!! Was there ever anything so monstrous!... » Today, my former opponents, and their pupils, constantly apply my method and describe it..... forgetting of course to mention my name.

b) *To obtain softening.* — Inject the mixture of naphthol camphor and glycerine, in a dose of from 3 to 8 gr. according to the age of the patient.

In this particular case, the injection should be repeated *every day* until the softening has begun.

It is on the *fourteenth or fifteenth* day (after 4 or 5 or 6 injections) that you begin to perceive, in the centre of the mass, or in the culs-de-sac of the injected joint if you are treating an arthritis, a sensation of elastic resistance, or even of free fluctuation announcing the fact that softening has occurred.

From that time, you puncture and inject, but extending the intervals between the sittings, not making more than one each week.

You will go up to 7 or 8 punctures and injections (counting from the day when the softening was obtained).

In a word, one proceeds here practically as if one were dealing with a tuberculosis suppurated at the onset.

If there still remain here and there small indurated points, they need not detain you, for they will disappear eventually, in the course of the progressive contraction of the injected tissues, a contraction which continues for a very long time.

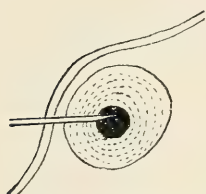


Fig. 146. — The liquid produces, in the centre, a cavity which increases gradually, by successive softening of the layers of the tuberculoma.

Which ought one to seek for? Hardening or softening?

Softening is *better on principle*, for it leads to the complete expulsion of the tuberculous products out of the organism, whence the cure is more certain and more definite. But, on the other hand, the inflammatory reaction set up by the softening injections is notably more marked; it is sometimes even a little painful, although in patients who are faint-hearted and in no hurry, such as the children of the upper classes, I would advise you to begin the injections of oil, creosote and

iodoform, which may suffice, and even have 70 chances in 100 of sufficing : — except, in the case where, four months later, the cure has not been obtained thus, one has recourse then to the softening injections of camphorated naphthol.

Or again, you could adopt the following formula :

For *tuberculoses, recent, and of benign appearance, try hardening* (injection of oil, creosote and iodoform).

For *old tuberculoses of grave appearance, try softening* (injection of camphorated naphthol).

I have just pointed out the reaction produced by the injections in the dry or fungating tuberculoses.

This reaction is desired. It is necessary. Its object is to transform the chronic inflammatory process produced by the bacillus into a subacute or even distinctly acute inflammatory process.

Therefore, the injections bring about, or ought to bring about, an inflammation, slight or intense. It is slight with the oil, creosote and iodoform, it is more active with the naphthol, camphor or the sulphuricinated phenol. It depends also on the dose of liquid injected and the greater or less frequency of the injections.

Let there be no misunderstanding : it is not of the immediate reaction that I am speaking here; for with our liquids, the reaction is nil or insignificant, whilst with iodoform and ether, it is very active, and with zinc chloride it is very painful, even agonizing, for several hours.

No, I wish to speak of the reaction of tomorrow and the day after. A reaction looked for, I repeat, a welcome reaction, since we wish for nothing less, with the naphthol camphor and our softening mixture, for example, than to transform, in a few days, into a liquid state, solid and sometimes very hard tuberculous masses. It is evident that this cannot occur without symptomatic manifestations which accompany the formation of an acute abscess, or, at least, a « tepid » abscess.

Above all things never forget to forewarn the parents or

those interested, of the early appearance and need for this local and general reaction, without which you will expose yourself to reproach or even find yourself refused permission to continue the treatment; whilst if they are forewarned, they will find all this quite natural and very satisfactory, since reaction is the herald of the approaching softening of the fungosities and of the success of the treatment. Still, it is necessary that the inflammation should not pass a certain point, beyond which it would be very painful. The ideal is to reconcile everything, to liquify the fungosities without fatiguing the patient, which is what happens generally, if you keep to the doses and the intervals indicated above (v. p. 165).

If, in some patient, the reaction obtained after the first injections is not sufficient, increase the dose, or lessen the intervals between the injections. If, on the contrary, the reaction obtained from the beginning is more intense than would be desirable, reduce the dose to be injected and allow more time to elapse between two injections.

The indications and method of employment of the other softening agent for tuberculous lesions.

To obtain *softening* in fungous arthritis, we use as a rule, *naphtol*, *camphor* and *glycerine*. This mixture is an excellent one, but acts only when injected in considerable quantity, 3 to 8 gr. as we have said, in the treatment of arthritis, where the injection is made into a joint cavity, but it is not so in the case of a small cervical gland, where one cannot inject the necessary 5 or 6 gr. of liquid, nor even 3 or 4 gr.

In that case, in order to soften a hard adenitis, it is better to use a liquid active even in a very small quantity. Such is the mixture of equal parts of sulphoricinated phenol (20 per cent, 20 parts of pure phenol to 80 of sulforicinate of soda), of camphorated phenol and *naphtol* and spirit of turpentine.

6 or 8 drops of this liquid are sufficient to effect the softening of the gland. This is how you will use it :

Inject 6 or 8 drops into the centre of the gland or tuberculous mass.

If, after 24 hours, the reaction which follows the injection is very active, if there is distinct local pain, insomnia, fever above 38°, keep to this one injection. On the other hand, if the reaction is almost nil, again inject 6 or 8 drops of the mixture next day or the day after; this time the injection will be nearly always sufficient to produce softening. You have only to wait until the softening has taken place, which you recognise by the appearance of fluctuation, perceptible at the end of three or four days.

Then, you puncture; you withdraw a viscid pus, the colour of mahogany.

If the skin is reddened, do not repeat this, wait before making another injection, until the skin has become normal. *If the skin is not reddened*, inject again, but this time with naphthol, camphor and glycerine; and repeat the puncture and the injection (of naphthol, camphor and glycerine) every four days; you thus make 6 or 7 punctures, with or without injections, according as the skin is normal or reddened. After the 6th or 7th puncture, you make a last puncture, this one without consecutive injection, and then apply pressure. In a word, you proceed as in the treatment of an ordinary cold abscess. If, two or three weeks later, there still remains a crescent of gland, unaffected by the injection, recommence the injections of softening mixture, and carry on this second treatment like the first, with the double purpose of softening the fungous mass and preserving the skin.

It is needless to go on fighting against the small remaining vestiges of the tuberculous mass; they will disappear in due course, by themselves, by a process of hardening.

III

THE TECHNIQUE OF INJECTION IN THE TREATMENT OF TUBERCULOUS FISTULÆ

We shall study, p. 229, the respective values of the different treatments of tuberculous fistulæ; surgical operations, expectancy, physiotherapeutic methods, sea-air baths, salt-

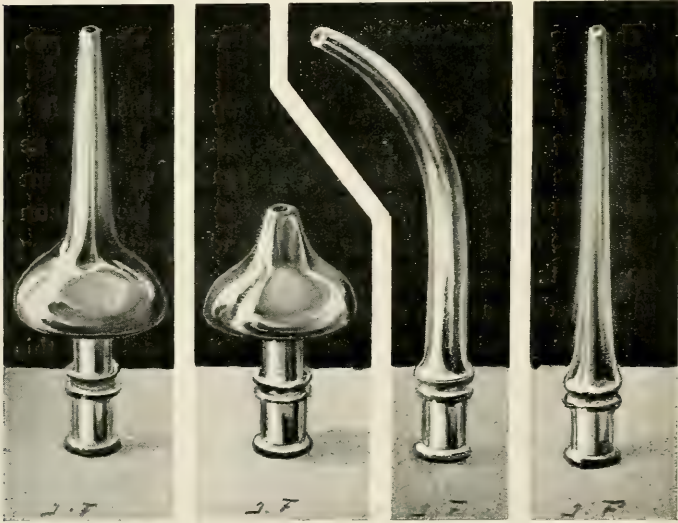


Fig. 147 to 150. — Our different models of nozzles for injecting into fistulous tracks of different shapes.

baths, or sulphur baths, sun-baths, radio-therapy, radium-therapy, **modifying injections.**

We shall see that of all these treatments, the last is ever so

much the best, and we will tell you why it is the best. Here, we will speak only of the technique of these injections.



Fig. 151. — Nozzle with a cup-shaped extremity for emptying.

Substances for injection.

Is there anything which has not been injected into tuberculous fistulæ, from the Villattes-liquor of our grand-fathers to the pommades so much lauded in our own days, passing

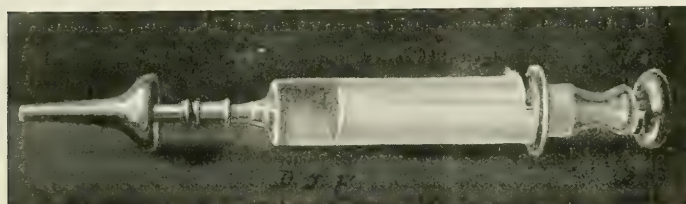


Fig. 152. — The syringe, in glass, mounted with its nozzle.

by the injections of boiled sea-water, dilute tincture of iodine, weak solution of zinc chloride, tincture of aloes, etc.?

Well, I have tried all those injections. And after having tried them all, I have come back, always, to our injections of oil, creosote and iodoform, and naphthol camphor and glycerine. Clinical experience brought me back to them; but reason demonstrated beforehand, that these liquids, already recognised as the best for purifying the wall of cold abscesses should also be the best for purifying the fungous wall, almost identical, of

tuberculous fistulæ. These medicated agents are employed in fistulæ under *the same form*, cold liquid, as in abscesses, whenever the anatomical disposition of the orifice and of the cavity allows of the liquid being retained in place.

This is how to proceed.

Make, through the orifice of the fistula, with an ordinary glass syringe furnished with a nozzle of the length and form appropriate to the track, an injection of 4 to 10 gr. of one of the two solutions mentioned; block the orifice immediately afterwards, either with a small cone of absorbent cotton wool forming a plug, introduced into the orifice of the fistula to a



Fig. 153. — Glass and ebonite syringe for the treatment of fistulæ (which can be used in the absence of the glass syringe of Collin or of Luer).

depth of 2 or 3 cm., or, simply with a tampon of cotton wool, which, placed flat over the orifice, pushes the lips gently inwards — depresses them, in such a way as to prevent the escape of the fluid introduced; if there are several orifices, an assistant blocks in the same manner the other orifices with small conical plugs of wool or small tampons.

All these tampons are kept in position by a Velpeau bandage carefully applied.

The day after the next, give another injection, and so on every other day.

Each time, remove the tampon, or the small conical plugs, and allow the cavity to empty : then inject again.

If the orifice is gaping, if the daily introduction of the syringe and the contact of a more or less irritating liquid increases the aperture too much for the liquid to possibly remain in its place, it is advantageous to suspend the injection for a few days, which will allow the orifice to contract a little.

Toward the twenty-fifth day, that is, after about 10 injections, the active wall is sufficiently modified and refreshed to allow of their closing and to reckon upon the union of the wall of the tract.

This union is assisted by compressing the parts with small bands of cotton wool placed cross-wise and held firmly by Velpeau bandage. This is not always easy (in the case of inguinal fistula in Pott's disease, for example); but it is done whenever possible.

If adhesion of the two walls is not obtained at the first attempt, if after 20 days, during which compression must be kept up, there is still an oozing, it is necessary to recommence a new series of from 8 to 10 injections, proceeding as before.

This second series, followed by compression and a second period of waiting, heals another group of fistulæ.

If the fistula is still not cured, I advise you to wait 3 or 4 months before making further injections.

During these 3 or 4 months of simple aseptic dressings, and of rest, especially at the sea-side or in the country, the fistulæ close at last, nearly always, even though they be connected with bone or a joint, provided that one is dealing with fistulæ not infected (no fever and no

albumen being present) (v. p. 225).

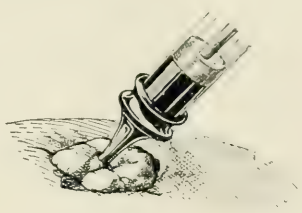


Fig. 154. — The nozzle of the syringe finds the track between the swollen tissues around the orifice of the fistula.

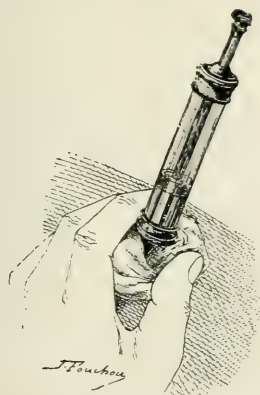


Fig. 155. — Intra-fistulous injection. A strip of damp cotton wool is rolled round the nozzle of the syringe; the left hand of the operator firmly compresses the wound with the tampon, whilst the right hand removes the syringe immediately after the injection is completed.

With a little experience and precaution, you succeed, by means of the conical plugs of cotton wool or tampons, in retaining the liquids in many fistulous tracks.

But with most fistulæ, it is not so; the orifice, or orifices, are gaping too much to allow us to completely close them with the conical plugs or tampons of wool, and to retain completely the liquid in the fistulous tracks. In that case, it is necessary to incorporate the active substances (creosote, iodoform,

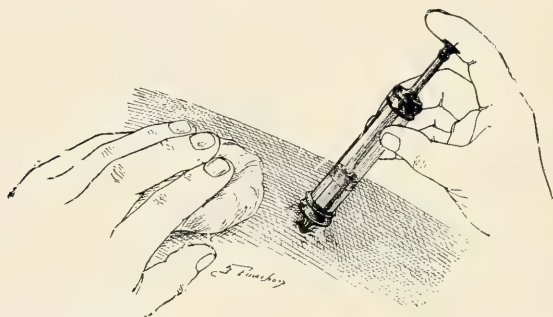


Fig. 156. — Communicating fistulæ. The injection is pushed into one of the fistulæ, while the left hand, in order to keep the injected liquid in its place, blocks the other fistula or fistulæ by means of a large tampon.

naphtol, or camphorated phenol) with a paste which will dissolve in a water-bath at a temperature of 40° or thereabouts, and which, being introduced in the form of liquid (without scalding the patient) becomes solidified at the end of one or two minutes, at the temperature of the body.

We have carried out this method for 15 years (that is, 10 years before Beck of Chicago) at our Oise Hospital at Berck, with our assistant P. Pesme, who mentioned our results in his thesis (in 1900).

We used at the beginning, a bougie of stearin and naphtol camphor in the proportion of three parts of stearin to one of naphtol camphor. The stearin bougie was previously sterilized by boiling for 20 minutes over an open fire. Before each injection, we used to dissolve our paste in the water-bath.

Immediately it liquified, we injected it and kept it in place with a tampon, until it was solidified; that occurred after one or two minutes.

The injections were repeated every 3 or 4 days, until 5 or 6 injections had been given.

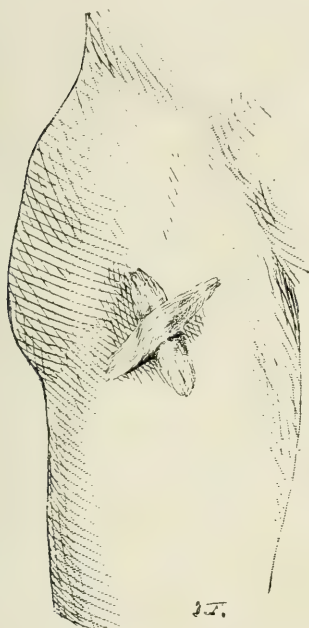


Fig. 157. — The dressing after injection. 1. Two tampons crossing each other over the fistula to preserve its occlusion.

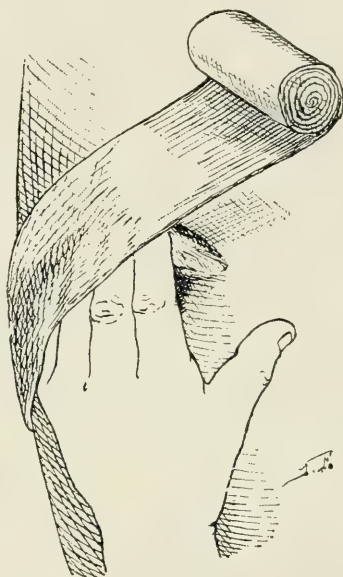


Fig. 158. — 2. An assistant holds the tampons whilst the bandage is applied, the pressure of which keeps the liquid in place, until the next injection.

We have obtained cures by this method; but we observed sometimes in cases of fistulous passages leading into cavities larger than the tracks, phenomena of retention, such as are noticed as well with injections of paraffin pastes: this is due to the fact that stearic acid and paraffin have a melting point relatively high (60° about), and are substances but slightly

absorbable. That is why we use hardly anything else to day but the following preparations, which give us every satisfaction¹.

OUR PASTE N° 1.

Phenol camphor.	}	ââ	6 grammes.
Naphtol camphor			
Gaiacol		15	—
Iodoform		20	—
Lanoline (or spermaceti)		100	—

The melting point is about 40° (slightly above).

OUR PASTE N° 2.

Phenol camphor.	}	ââ	3 grammes.
Naphtol camphor			
Gaiacol		8	—
Iodoform		10	—
Lanoline (or spermaceti)		100	—

The melting point is about 40° (slightly above).

The first of these pastes being twice as active as the second, we use it for cavities or fistulous tracks of small capacity, that is, of less than 10 cc. in a child, and of less than 20 cc. in an adult. Inversely, we use the paste n° 2 for large cavities, that is, those exceeding the dimensions we have just given.

You may inject 10 cc. of the first in a child of ten years, and up to 20 cc. in an adult.

Of the second paste you may inject double the quantity, that is 20 cc. in an infant and 40 cc. in an adult.

As a matter of fact we hardly ever reach those figures, but they may be reached without inconvenience.

If you take care not to exceed them, you will never observe a serious accident of intoxication, whilst there have been cases of death with the bismuth pastes. Neither will you

1. You can prepare these pastes yourself, as we have personally done, or you can order them from your pharmacist, if you are certain of his asepsis, or you may inquire of Messieurs Ducatte, or Johan, or Gogibus of Berck.

have any accidents through retention¹ with our preparations.

As to the technique, it is the same as that indicated above for injection of the stearic acid and naphthol camphor paste, that is, you soften the paste in a water-bath, then you charge the syringe, previously warmed (in hot boiled water), and immediately introduce the injection into the fistulous track in the way represented in fig. 159.

We will go into some of the details.

The flask of paste, opened, is placed in water in a saucepan heated by a spirit lamp or by gas. After some minutes, the paste softens; then stir with a glass rod in order to render it homogeneous.

Then, from the wide-mouthed flask containing the paste, charge your syringe, which has previously been warmed by filling and emptying two or three times with hot water which has been boiled (at 40° or 45°); attach to the syringe a metallic nozzle appropriate to the shape of the track and already warmed like the syringe, in hot water. Immediately push the injection into the fistula.

If several fistulæ exist, push in the whole of the injection by one only of the orifices, which you know to be in communication with the others; whilst the injection is penetrating, close all the other openings with tampons supported by one, two, or three, improvised assistants.

You will notice that there is a double danger to avoid. The first is that of injecting the liquid too hot, in which case you run the risk of scalding the patient. The second is, on the contrary, injecting the liquid too cold, in which case the fluid will solidify in the syringe before you have time to inject it. You will easily succeed, with a little practice, if you guard

1. It remains to be well understood that you never make a modifying injection of any kind in case of infected tuberculous fistulæ, as is explained on p. 238.

against this double danger, which is, otherwise, but little to be feared, if you use our paste.

When the paste is liquified, it is at the temperature of from 40° to 45° ; you then charge your syringe at once. If, at this moment, the paste appears to be too hot, which the practitioner can judge by simply feeling the syringe, wait 5, 10 or 15 seconds before injecting : wait until it has cooled down to about 40° , which is the right temperature, neither too hot nor too cold, for injection.

Push your injection neither too roughly nor too slowly; take 5 or 10 seconds, for example. I am in the habit of using a large syringe of 20 cc. capacity, but the ordinary small syringe can be used.

If the cavity is small, the piston of the syringe is very soon arrested, or, the fluid may return. In that case you keep the syringe in its place until the solidification of the liquid paste is effected.

If the cavity is very large, if it is not filled by the contents of the syringe (which happens sometimes when only a small syringe is at your service), quickly remove it (keeping up pressure over the orifice with a tampon), then charge it afresh to inject a second dose, and, if need be, a third, until you reach the quantity of paste given above. Nearly always you will have to stop before this on account of the resistance offered to the penetration of the liquid, and sometimes by the painful sensation of fullness complained of by the patient. However, when there is but little pain, you need not take much notice of it, it will pass off almost immediately.

Once the solidification of the paste is produced, apply the dressing.

The subsequent reaction is variable; sometimes there is none, in other cases it may be accompanied by a fever of 38° or 39° for or one two days (I speak always of non-infected fistulæ, for in fistulæ which are infected, the reaction may be

much more active, and in them, as you know, injections are contra-indicated for other reasons).

In case of fever, remove the dressing next day and, if the region is red and tense, apply a damp dressing; if it is not, apply an ordinary dry one. At any rate, when there is no fever following the injection you must change the dressing on



Fig. 159. — Technique of the paste injection when there are several fistulæ present.

There were eight in the present case. You introduce the nozzle (straight or curved according to the case) into the most accessible passage; while one, two or three assistants armed with tampons block the other orifices, you push in the injection gently and evenly, without jerking. You hold on, with the help of the assistants, until the paste is solidified (which requires about a minute and a half to take place).

the fourth or fifth day, and even sooner in cases where the discharge is very abundant.

Sometimes the discharge dries up at once. I have observed the fact several times. I have seen especially a discharge, continuing for three years, dry up after a single injection of paste of naphthol camphor. That was the case in the patient represented on p. 232 (fig. 191).

Scarcely ever, however, is the result so complete and so rapid. The discharge does not cease, still it is already a

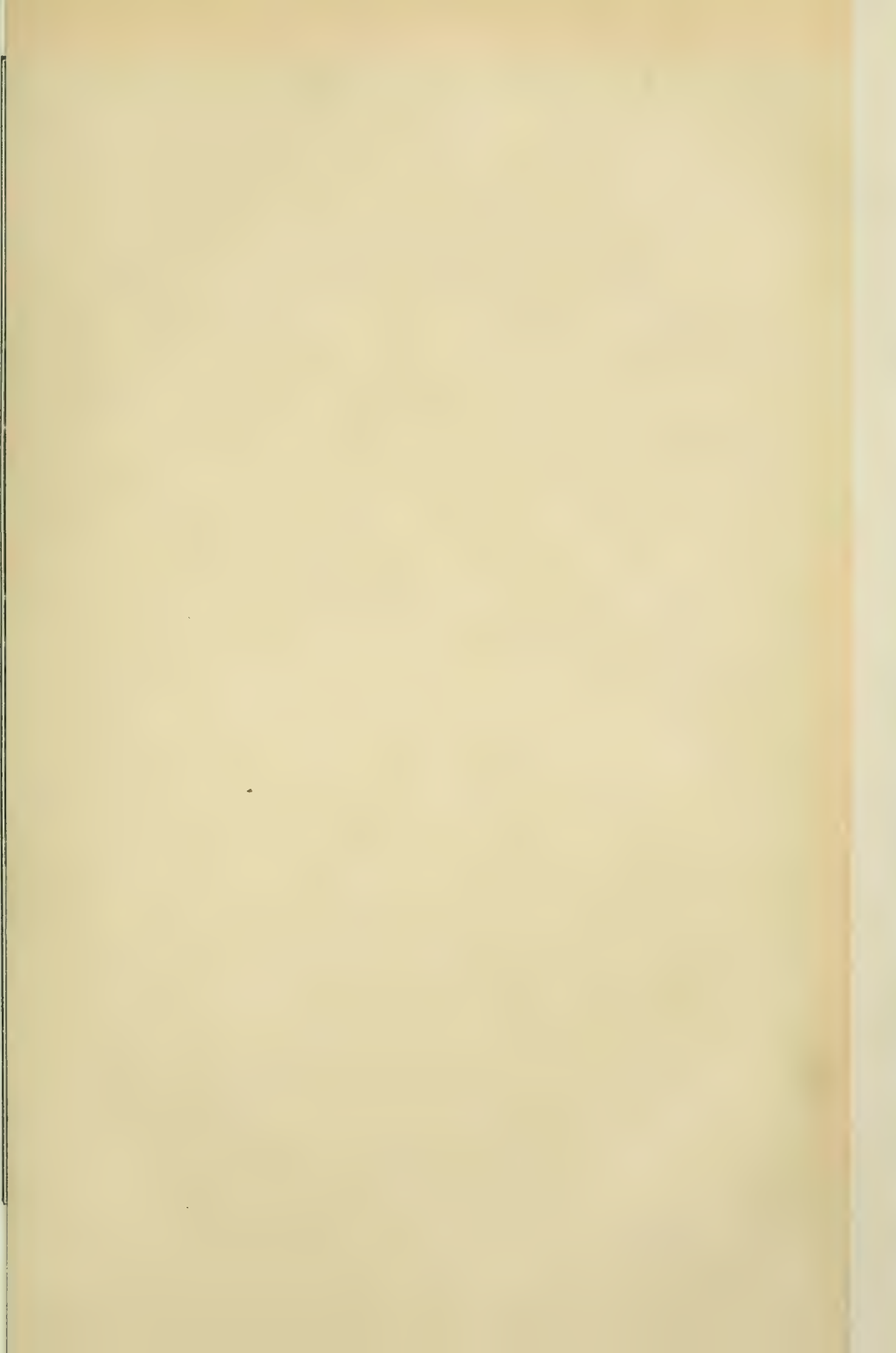
little modified; it contains débris of the paste; it is more serous.

Make a second injection on the fourth or fifth day after the first one. Recommence the injections of paste every four days, until they amount to seven or eight injections.

Then, a period of waiting of equal duration — 30 days, after which the fistula is often closed; if not, recommence a new series of injections and a new period of rest, and so on for six months. Then, three or four months of rest and aseptic dressings, without injections as above, until you have obtained a cure, which will happen nearly always¹, even in fistulæ of osseous origin, provided that we have to deal with non-infected fistulæ and that the patient is placed under good general treatment (life in the country, or better, by the sea).

Refer to p. 225 and onwards as to the question of the prognosis of tuberculous fistulæ; here, as we have already said, we are speaking of the proper technique of the injections only.

1. We have used bismuth pastes in the same way; but they have given much less satisfactory results than our own preparations of naphthol-camphor, gaiacol and iodoform.





The children of the " Institut orthopedique " of Berk, on the sands.

SPECIAL TECHNIQUE

OR

A Study of each **External Tuberculosis** and of each
Deformity, in detail.

FIRST PART

ACQUIRED ORTHOPÆDIC AFFECTIONS OF TUBERCULOUS ORIGIN

CHAPTER IV

ON THE PROGNOSIS AND TREATMENT OF EXTERNAL TUBERCULOSES

*A. — The attitude practitioners take in the presence
of these affections.*

How many times have I wished that practitioners who have the treatment of hip disease, or of Pott's disease, or of white swellings, would come and pass a few days, or even a few hours, at Berck, where external tuberculoes come to us in thousands from all over the world! A simple visit would spare them many disappointments and disasters, in showing them, so to speak, the watchword, and putting them into the proper state of mind for carrying out the treatment well.

They would carry away as "souvenirs" of Berck, the capital notions which follow and which are too little known, and which also summarise « **all the wisdom** » acquired concerning external tuberculoes.



Fig. 160. — Patients passing the whole day on the shore at Berck in a continuous bath of sea air, light and sun.

1. The **duration, particularly long**, of these affections, is that of one year for a minimum, and often several years¹. The obligation resting upon the practitioner to watch over his patient, not only during the long period of activity of the disease, but far beyond that, for perhaps one year, two years, three years, in default of which a relapse may occur, and the entire orthopædic results obtained up to that time, lost.

2. The **necessity** for all patients to live **out of doors from morning until evening, in all seasons and in all weathers**², in a perpetual bath of pure air and sunlight.

3. The necessity for keeping at rest in the recumbent position, of patients afflicted with Pott's disease, hip disease or tuberculosis of the lower limbs, until the focus is extinguished, that is, in many cases, for several years.

Well, all this you will learn in a short visit to Berck. At the same time you will see how the two indications for **outdoor** life and the **recumbent position**, which are considered by some people to be irreconcilable³, are in reality easy to reconcile, even for people of small means. The only thing is to put the patients on a "cadre".

1. In reality, if, in their common forms, these tuberculoses can be cured in a year, it is only on the condition of their being treated by injections made *into* the focus. Without injections it will be necessary to reckon three, four or five years. Unhappily, there are cases where the injections are not practicable; for example, Pott's disease without abscess; the vertebral body, the seat of the lesion, is too far away to be reached by the syringe without uncertainty and without danger.

2. They are clothed in a suitable way, and sheltered if need be.

3. That which makes them, so often, sacrifice the one to the other.

The Germans and the English, in carrying out the general treatment before the local treatment, allow their patients to walk about, to ensure for them, above all things, life in the open air.

The French, on the contrary, give the preference to the local over the general treatment, keeping their patients in bed « in the ward » (as one sees in many hospitals for children) — which is, perhaps, a worse mistake.

The correct formula is. — **plenty of air and perfect rest at the same time.**



Fig. 161. — How the patients are installed here in the open air and how they could be installed anywhere.

Here is a very simple model of a wooden bed (cadre) with

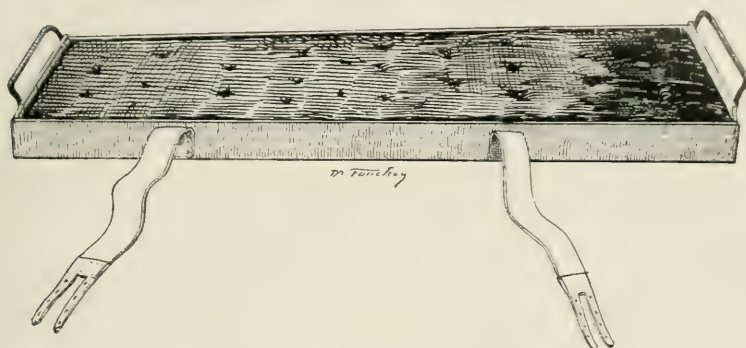


Fig. 162. — The bed upon which the patients lie.

a mattress of horse-hair, designed so that it may be constructed everywhere.

The patients are laid horizontally and strapped on these

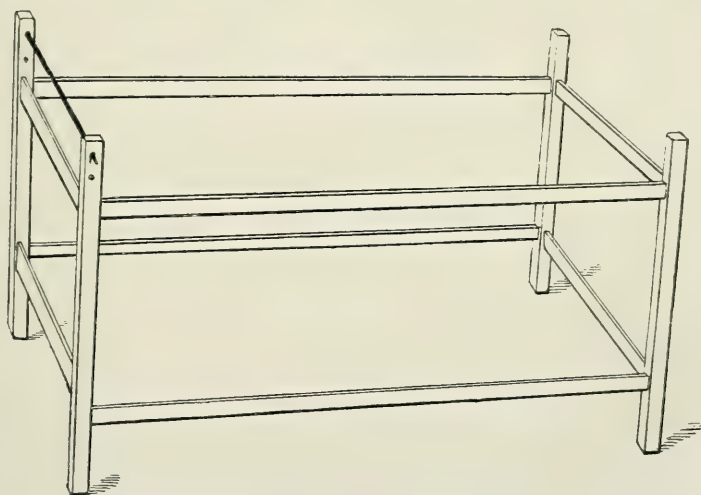


Fig. 163. — The bed is placed on this wooden frame.

beds, provided with a handle at each end to allow of their easy removal into the open air.

The patients are thus carried every morning out of doors; they pass the day, *immobiles*, either on trestles or on a chassis (about a metre high), or even simply on the ground, or *taken out* in the small carriages (such as those you see by hundreds furrowing the sands at Berck¹).

4. You learn also at Berck that, contrary to wide-spread prejudice, the patients **do not pine away, nor are wearied, in the recumbent position.**

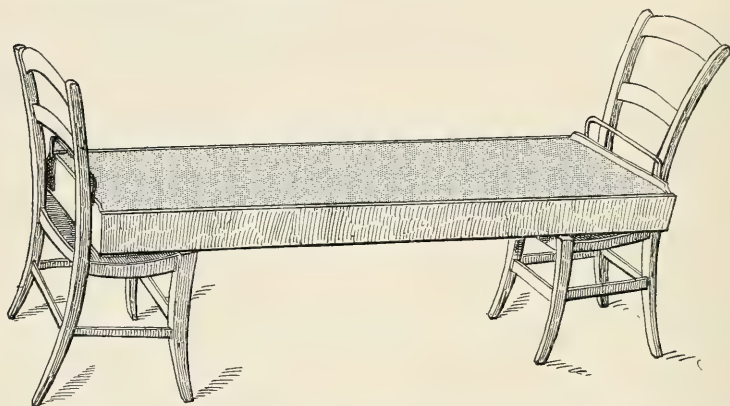


Fig. 164. — In default of trestles, the bed is placed on two chairs.

The first thing which strikes and surprises all the visitors is the very happy countenances, rosy and plump, of all the patients, extended on their beds. Therefore, medical men will be able to reassure parents who are fearful, *a priori*, for the general health of their children, and, as to the effects of the recumbent position kept up for so long a time.

How natural and essential this position, which seems so abnormal elsewhere, appears at Berck !

At Berck — owing to the surroundings, and to the example

1. The same is done for all affections (other than the external tuberculosis) the treatment of which requires a long rest (namely rickets, infantile paralysis, congenital dislocation of the hip, osteomyelitis, syphilis of the bones and joints, etc.).

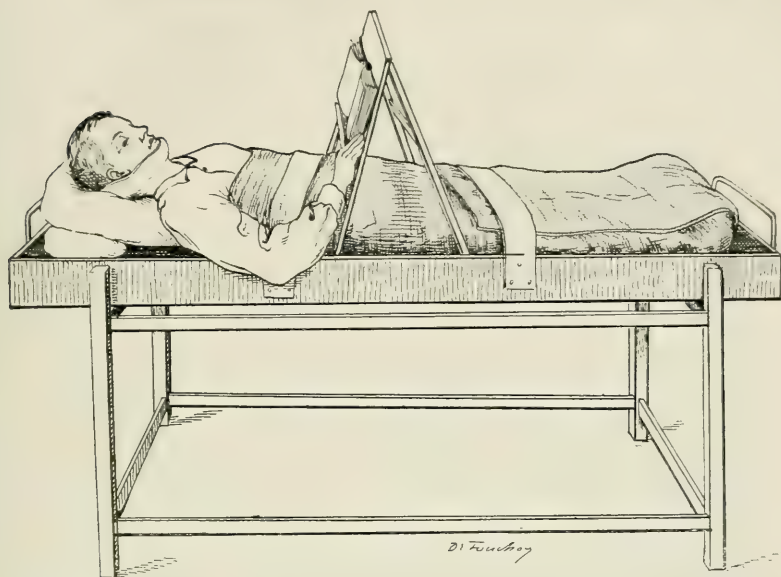


Fig. 165. — Thanks to a movable reading desk, the patient is able to read and work. As can be seen, this patient is wearing a large plaster apparatus for Pott's disease.



Fig. 166. — The patients take their meals in the open air.

set to the new patients by those already cured — everyone, from the day of arrival, cheerfully accomodates himself to the common régime of rest in the recumbent position.

5. Finally, practitioners would learn at Berek that **difficult** and nevertheless so **important** thing — **not to operate on these patients**. They would learn that the *knife is the enemy of these affections*¹; that the first condition to cure



Fig. 167. — In order that they may get about, the bed is transferred to a small carriage.

what are called the surgical tuberculoses is, in reality, never (or very nearly never) to perform a surgical operation and to put away all the grand array of instruments in order to take up this “ inglorious ” work, which consists in making injections and punctures, gentle redressments, plastered apparatus, dressings.

1. A general practitioner may agree to this perhaps, but it will be more difficult to convince a surgeon who has generally been trained to place all his faith in the knife.

Why these affections are so well cured at Berck.

In the local treatment and in the observance of hygienic rules and general treatment lies the secret of the cure of exter-



Fig. 168. — A patient driving his own carriage. In the background, other carriages standing.



Fig. 169 — Patients (at Berck) meeting for conversation and enjoyment.



Fig. 170. — When the disease permits of some movement (as in the case of this child with tuberculous disease of the foot), the bed is placed on the sand and the child joins in the amusements of his friends who are already cured.



Fig. 171. — These two children, suffering with Pott's disease, have been recumbent and plastered for 18 months. One can see that their general condition leaves nothing to be desired.

nal tuberculoses at Berck — not forgetting, mind you, to allow for the **effect of the sea-air**.

It is, thanks to that, that the medical treatment is reduced, at Berck, to almost nothing. The keen air of the sea shore stimulates the appetites of the patients and ensures the good operation of the digestive organs. They eat “ double ”, they digest well, they grow fat — and therefore have never — or hardly ever — need for medicaments.

One may **recapitulate**, in a few words, what is necessary to be done to cure the large external tuberculoses :

“ **Prolonged Rest — Life in the open air — Rational overfeeding — Modifying injections — Well-made apparatus.**

With this additional advice on what is not to be done : —
“ **No surgical interference — No violent redressment.** ”

B. — Prognosis of These Affections.

The risks of death and the means of preventing them.

As soon as you have made the diagnosis of Pott's disease, hip disease or white swelling, you will ask yourself — before even speaking of treatment — will the patient be cured?

In order that you may answer the question, we will proceed to describe what are, in the above diseases, the risks of death and what are the means taken to guard against them.

The risks may be arranged under three chief heads :

1. *Slow septicæmia* leading to *visceral degeneration*.
2. *Generalised tuberculosis* (in the lungs, kidneys or bladder).
3. *Meningitis*, which is, correctly speaking, only one form of generalised tuberculosis, but requires special mention on account of its importance.

1. Slow septicæmia, hectic fever and visceral degeneration.

(fig. 172, 173 and 174).

This is the cause of nine-tenths of the deaths in Pott's disease and hip disease — it is the same at Berck as in Paris. Twenty years ago, at the “ Hopital Maritime ”, a series of twelve cases of Pott's disease which had suppurated, were operated upon and curetted by the great surgeon Cazin of Berck. Eleven of them succumbed before the end of the first year, and the twelfth the year afterwards, all carried off by slow progressive wasting of the body (hectic fever and albuminuria) which followed the operation at 3, 6, 9 and 10 months. Of 100 cases of hip disease resected about the same time by the same expert surgeon, 90 were dead in less than ten years after the operation, carried off, also, by slow septicæmia and hepatic and renal degeneration.

This terrible *dénouement* was so classical that one used to

say at once of every child stricken with hip disease or suppurated Pott's disease, " He is a dead child. "

But I speak of twenty years ago!

Today this frightful nightmare is at an end! Everything

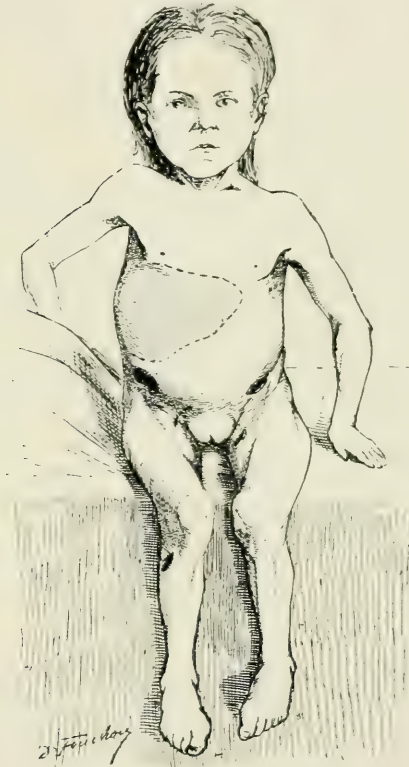


Fig. 172. — Pott's disease with fistulæ; the cachexia is made apparent in this child by an exceedingly large liver. (Fig. 173), albuminuria and fever (v. fig. 174).

is changed, so thoroughly changed, that the reverse is now true. The fate in store for these patients is not death, but cure.

We like to repeat, in the familiar causeries of our practice, that our profession (especially with regard to us who study external tuberculoses) was at one time the worst of all, the most

depressing, the most demoralising; that to day it is the most beautiful, the most comforting, that which produces the most numerous and excellent cures, that in which we have the greatest certainty of being useful.

What has worked this miracle? It should be, here as in

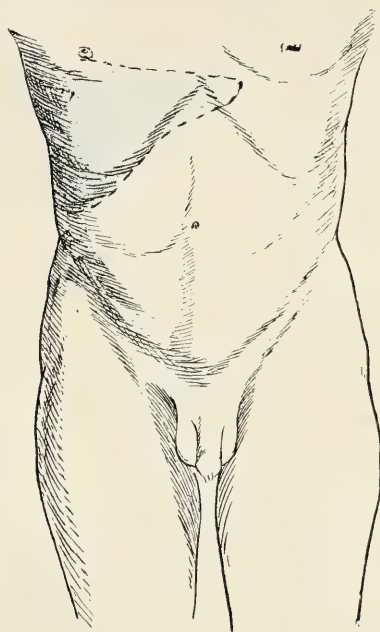


Fig. 173. — Normal outline of the liver.

all other departments of surgery, the advent of antiseptics and the perfection of technique. Never!

It is not because we perform the operations more aseptically, more correctly and more rapidly; it is simply because we operate upon them no longer.

For, by not operating upon the tuberculoses, by not opening the bacillary foci (nor allowing them to open), we close the door to external septic infections, whilst, by operating

upon them (**however clever the operator**)¹ a door is opened for the secondary septic infections which conduct the patient to death². That is what we have learned in an experience of twenty years.

All that, we have already said; if we return to it once more, it is because it is necessary, seeing that so many surgeons or physicians **persist in closing their eyes to the**

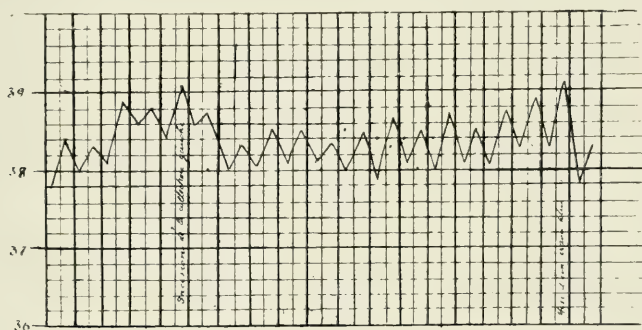


Fig. 174. — Portion of chart in the case of the child in fig. 172 suffering with Pott's disease and operated upon (incision and scraping) for an abscess in the right iliac fossa. The patient succumbed in the thirteenth month of hectic fever and degeneration.

light and still transgress, every day, the great commandment, the fundamental dogma, of never opening tuberculous foci.

The Means of Preventing the first Risk of Death.

These means you have guessed at; they are most simple, and observe that, in reality, it gives us less trouble nowadays to cure our patients than it did formerly to kill them.

1. The great surgeons, who, by their so-called radical operations, undertake to remove the whole of the trouble, will succeed only in one thing; they will remove everything..... the patient.

2. « In closed tuberculoses, cure is certain. To open the tuberculoses (or allow them to open) is to open a door by which death too often will enter. »

What must be done? In the presence of a non-suppurated tuberculosis, abstain from any cutting operation; in the presence of a suppurated tuberculosis do not touch it if the tuberculous foci are difficult to attack, in which case they do not threaten the skin; when they do threaten it and they are then easily accessible, puncture and inject them; we have described how to do this (v. Chap. III).

Then you will cure hip disease and Pott's disease, always, or nearly always.

And not only you, but also the second year's student, who knows how to make a puncture and an injection, will cure external tuberculoses infinitely better than the great surgeon who is anxious to operate upon them at all costs. As you see, you require only the inclination to be able to suppress this first and great risk of death which threatens patients suffering from the grave external tuberculoses : *slow septicæmia and visceral degeneration*.

2. The Danger of a Generalisation of Tuberculosis.

This risk is much less than the preceding one — it is nearly as little as the first is great. Nevertheless, attend carefully to what I say.

If at Berck we scarcely ever see this generalisation — only perhaps once in a hundred cases — it is because Berck is, without contradiction, the ideal locality for these maladies, and is especially suitable for children. It is certain that for subjects — especially adult subjects — living in bad surroundings, the risk of generalisation will be very real. It is not very rare to find it in the large towns, where patients

1. I say nearly always because, in spite of all the efforts made to hinder the opening, one will not be absolutely successful in every case; for, if the technique of punctures and injections is relatively easy, it is nevertheless very minute, and one may make mistakes in applying it — “*errare humanum est*”.

who have commenced with a Pott's disease, or hip disease, or a white swelling of the knee, finish with tuberculosis of the lung.

How can the danger be warded off?

The remedy should be to make all these patients live by the sea; but it is impossible, evidently, for most of them to do so, and this is why practitioners, wherever they are, ought to know how to treat the external tuberculoses. (They will, I hope, give me credit that I am endeavouring to assist them, and that this book has no other purpose).

However, I will say to them, your patient cannot go to the sea-side; therefore he is, certainly, a little less well armed against a generalisation of tuberculosis, maybe; but, at least, you do not accentuate this drawback, nor lessen — by the kind of life you allow him to lead — the very great chances of cure which remain to him.

I will explain what I say.

What makes the superiority of a sojourn at Berck is not only that the pure air is more tonic than at other places, but that the patients profit more by it.

For our patients at Berck — hip cases, Pott's, etc. — live in the open air *from morning till evening in all seasons and in all weathers*, keeping always at rest, reclining on “*cadres*”, on the small carriages that promenaded the sea-shore (fig. 175). I intentionally insist on this point.

But what do you see in the country, and especially in a large town?

You see patients affected with hip disease, Pott's disease, white swelling, who, especially if they are at all suffering, are shut up, hidden away in their chambers and in bed with every chink stopped up. This they do for material reasons; because one has not contrived, and one does not know how to contrive, their going out of doors “*in bed*”; they have not, as a rule, either a transportable bed nor a carriage.

And also, for moral reasons; because the patient himself refuses to go out, and because his parents avoid making him

do so; he does not wish to be seen, and they do not wish to expose him.

A young lady afflicted with Pott's disease, and lying on her mattress in a carriage, said to me. "Imagine my feelings if I were carried about the streets of our little town in this turn-out! At every step, I should be obliged to submit to



Fig. 175. — At Berck, our patients pass the whole day on the shore; their carriages are fitted with a leather apron and a hood, which protect them from the glare of the sun and from the rain.

the remarks and condolences of strangers, and still worse of my friends, and I, in this long low carriage, going at a foot pace, should think I were on a bier; anywhere else, I should be a phenomenon, whilst at Berck.... I am in the fashion!"

And this is why, in the country and in towns, the patients "moulder" in their chambers, which they never leave. Or, they who ought to be resting on a bed completely horizontal, so as to fulfil the best conditions for the repair of their hip disease or Pott's disease, are unwilling to go out, except upright, with or without an apparatus.

The Remedy for this Risk of Generalised Tuberculosis.

As to the remedy, there is only one, for your patients who are restricted to the country or to town life.

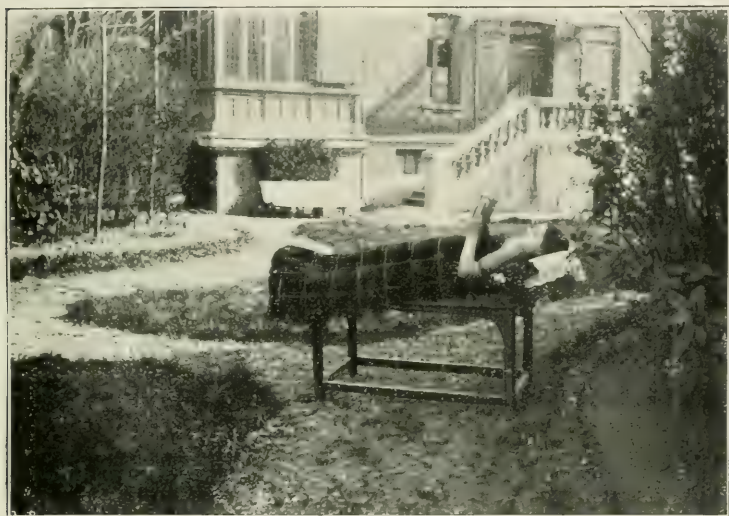


Fig. 176. — This is what you *could do everywhere* in the country. White swelling of the knee. The patient immobilised on a bed (the bed of wood, the mattress of horse-hair) which is carried into the court or into the garden, where he passes the day. Those suffering from hip disease and Pott's disease are laid entirely flat, without a pillow.

You must take your courage in both hands and impart it to your patients, to triumph together over all the prejudice and all the obstacles which would prevent them living out of doors.

In the country this is relatively easy to accomplish. The patient cannot have a carriage, it would cost too much, materially and morally; very well, be it so, he need only be strapped on a large "cadre" and carried in the morning into the garden, where he will pass the entire day (fig. 176).

In a town, it is less easily managed, I admit, for those patients who are not able to go away, and who possess no garden

of their own; but they might be able often, with a little courage and initiative, to be carried into the neighbouring square and remain there for many hours. When once the habit has been acquired, nothing could appear more simple.

If you do this, if you have the necessary energy and courage to carry out your intention, informing your patient and his friends that a cure is the prize to be won, you would overcome almost certainly the risk of generalised tuberculosis which is the second risk of death.

But it is not only by good general treatment that you can accomplish this.

It is certain that a **defective local treatment** may lead to a risk of generalisation; for example, a cutting operation is not only objectionable because it opens the door to septic infections and visceral degenerations, but also because it creates a risk of inoculation of the lungs and other organs.

Erasion, the scraping down of tuberculous tissues, which causes hæmorrhage in all such interferences, setting at liberty tuberculous bacilli which may move off to colonise far away, explains too well certain post-operative tuberculous generalisations. I have observed it undoubtedly in cases in my own practice fifteen or twenty years ago, at the time when I still operated upon external tuberculoses.

Add to all this that operations, in lessening the general resistance of the patient, render the organism still more vulnerable and more "inoculable".

The non-immobilisation of painful osteo-arthritis, the violent redressment of deformities of the hip, of the back, of the knee, may also favour or provoke the generalisation of tuberculosis.

I say that, in order to do away with these different risks, you must ensure perfect repose of the patient, construct comfortable, that is to say, well-fitting apparatus, neither loose nor tight, avoid rough redressments, and replace them by redressments which are gentle and progressive.

3. There Remains the Danger of Meningitis.

All that I have just said may be applied to meningitis. I consider that in improving on the one part the resistance of the subject and on the other by avoiding anything harmful in the way of local treatment, that is to say, any cutting operation, any roughness in redressment, any painful treatment, by forbidding brain work and exercise or premature walking, one puts the patients under the best conditions for preventing the onset of meningitis.

This gives me an opportunity of saying something as to the risk of meningitis created in children by sojourning by the sea, in particular by sojourning at the shores of the North of France. I believed in it twenty years ago, on the strength of the classical treatises. Well, I do not believe in it any longer, after twenty years experience and personal observation.

I will go further than that — I consider to-day that it is the contrary which is true.

But first, it is well known that all children, and with stronger reason, all carriers of external tuberculosis, may have meningitis. And it is still more true of those who are debilitated and ill-conditioned.

But at Berck, children are better than anywhere else — they eat better, breathe better, grow fatter, become stronger, and one can understand that they must be, *on this account*, more resistant and more *immune* against meningitis than they would be anywhere else.

And this is not a mere fancy nor a matter of opinion — the facts are there.

I have scarcely ever seen meningitis — only one, two or three cases a year — less than one in a thousand of the children afflicted with external tuberculosis whom I have treated.

But I hasten to add that that has been so for only a dozen years! I observed a considerable number of cases of meningitis in former years, perhaps ten or fifteen yearly.

Do you know why? Because at that time, now far off, I operated upon the tuberculoses, or I corrected at a single sitting tuberculous deformities (hip disease, Pott's disease, white swellings) as others did everywhere, and as many still do to-day.

When, then, certain surgeons put forward that their cases of forcible redressment of hip disease did not shew a greater tendency to meningitis than those left untouched, I affirmed distinctly to the contrary, basing my opinion on the results of my personal experience.

And upon another surgeon practising at a maritime station (not Berck) stating that he believed that he had observed an appreciable number of cases of meningitis *at the commencement of their sojourn at the sea-side*, (that is to say, at the moment when they would especially feel the effect of sea-air, the effect being too stimulating for some children), I replied that I had never seen anything to confirm that opinion; and that, if new patients are more disposed to meningitis, it is due, in my opinion, not to the stimulating effect of sea-air, but, very often, in some marine hospitals, **to their being operated upon or forcibly redressed soon after their arrival at the sea-side**. But we have already described the grievous influence on the meninges of such mischievous traumatisms.'

I could cite instances in support of what I here advance. Without wishing to spend too much time upon the question, I have said enough to draw the following conclusions, which I ask you to remember.

Practical Conclusions.

There are three risks of death in the external tuberculoses ; —
1. *Amyloid degeneration of the liver and of the kidneys*, which causes nine-tenths of the deaths.

This degeneration is due to the opening-up of tuberculous foci.

In order to guard against it, it is sufficient to prevent such opening-up. In other words, you ought never to operate upon

the tuberculoses, never to open an abscess by gravitation, but to puncture and inject it.

2. *A generalisation of tuberculosis to the lung, to the kidney, and to the bladder.*

You will avoid this nearly always if the patient live out of doors in the open air from morning till evening, and if you yourself abstain from all violent interference in the general treatment, that is to say, that you perform your redressments of hip disease and white swellings, gently and by stages.

3. *A Meningitis.*

You would always avoid this, or nearly always, by increasing the general resistance of the patient (and for this object, the sojourn by the sea is evidently the best; which does not, of course, dispense with watch being kept during the stay, especially if it is a question of a nervous child), by assuring the cerebral repose of the patients, by your abstaining from all cutting operations and forcible redressments¹.

It is possible to promise a cure.

And now you know the answer you have a right to give to those parents who, having brought you a patient with external tuberculosis, ask you at once if he will be cured.

Yes, you may promise them that he will be cured, or rather that you will cure him; for he will not be cured unattended; he will not be cured if he is treated roughly; he will be cured because you know what is necessary to be done and how to avoid what would prevent or compromise the cure.

1. Which does not mean, I repeat it, that you will not do what is necessary and sufficient for the redressment of vicious positions. No, you would correct them, but in the right manner. Formerly, I used to make forcible corrections after the method of Bonnet, of Lyons, which is still that of nearly all surgeons (by movements alternately of flexion and extension, movements carried on for a quarter of an hour). I have not made such corrections for many years now but I succeed as well today, with mild measures, slow and progressive, in correcting the vicious positions and keeping them corrected. And you will succeed equally well if you follow the indications given in this book for each deformity.

C. On the local treatment of external tuberculoses.

The following considerations are directed not only to the tuberculoses called “orthopædic” (Pott’s disease, hip disease, white swelling), but also to tuberculoses of the soft tissues (adenitis, synovitis, epididymitis, etc.).

The respective value of the different treatments.

1st In the suppurated tuberculoses.

In the presence of a **suppurated** tuberculosis, what would you do?

There are three possible treatments :

1st Operation;

2nd Abstention;

3rd Punctures and injections¹.

1st The value of surgical operation : Without doubt, surgical operation can claim a large number of cures, when it is made very completely, that is to say, in disease of the cervical glands, or in very accessible tuberculosis in the limbs.

Nevertheless, you know very well that to go very widely beyond the limits of disease is not an absolute guarantee of its cure; for a tuberculous inoculation of tissues, up to this time sound but vascular, and brought into contact with bacilli by the operative act itself, always remains possible; this accounts for the fact that, even in superficial accessible tuberculoses, the largest operations often leave fistulæ behind.

And fistula is the rule (for the same reason and especially,

1. I have not mentioned a fourth treatment, the *method of de Bier*, which, good as I believe it to be, in acute phlegmonous inflammation, whitlows, etc., is of no value, I am sure, against external tuberculoses.

because operation has not been able to get beyond the limits of the disease), when deep tuberculoses of bones or of joints of limbs are in question, and especially Pott's disease, for which it is always impossible to perform a really complete operation.

Fistula is the rule... Have practitioners the least doubt as to the mischief they have done in transforming this Pott's disease or that coxitis unopened, into a coxitis or a Pott's opened?

Closed, Pott's disease has 99 chances in a hundred of being cured; **opened**, the proportion is reversed : it is 99 chances in a hundred that the case will terminate in **death** — a little sooner, a little later. That is what the practitioner has done, with a light heart, in opening an abscess by gravitation.

It is a **door** leading to **death** which he has opened. Through the fistulae, in fact, will penetrate septic germs causing secondary or mixed infections, infections associated with the pure tuberculosis which has existed until then.

And if, after that, pus is retained, which it almost constantly is, in the long and tortuous tracks which separate, for example, a focus of dorso-lumbar Pott's disease from a fistula burrowing in the thigh — if such retention occur, it will be almost impossible to remedy it; there will be **fever** and **septic absorption** which will pave the way to **visceral degenerations** (liver and kidney), culminating in the **death** of the patient, after one or several years.

This is the constant result of surgical operations performed in Pott's disease ; I could quote hundreds of observations of this kind, but each of you will have known such in his own circle.

Doubtless, the situation is not the same in the case of superficial tuberculosis, cervical adenitis, iodopathic cold abscess, *spina ventosa*, osteitis or osteo-arthritis easily accessible, in which cases, if a fistula remain, the complete drainage of it does away with such retention and reabsorption.

But do not conclude that operation may never be seriously harmful in cases of superficial tuberculoses. The danger of secondary infection does not exist here, it is true; but can we

prevent the risk already pointed out of a tuberculous inoculation in the course of an operation, when, by the knife or the curette, the bacilli are brought in contact with vascular tissues thus harrowed and scraped? Inoculation will be spread by a **regional extension** of the tuberculosis, or by the **creation** of a new focus at a distance.

Here are some examples taken from a hundred such cases :

a. A great Parisian surgeon performed castration for an **epididymitis** dating back two years, in a child of 13 years. Soon after the operation, exactly three months, there appeared a right coxitis, and in the fifth month the left hip followed suit.

b. A little girl had, for three years, a double **spina ventosa** of the right hand. It was decided all at once to scrape it : nine weeks later Pott's disease appeared at two points (cervical and lumbar).

c. A young man 24 years of age was brought to me for left **epididymitis** by his brother, who is a medical man. I proposed modifying injections (see chap. XIX) into the site. The treatment doubtless appeared very simple to my confrere who went the next day to Paris, to consult one of his old masters, a very distinguished surgeon, who performed castration. Two months afterwards, the patient was carried off by meningitis before even the operation wound was cicatrised.

And I know of three other cases exactly similar to that.

d. Lastly, I hear from one of the surgeons who operate most frequently on appendicitis in Paris, that he has decided not to operate again on **appendicitis** when it is duly recognised as being **tuberculous** — because, having operated upon six such cases, he had seen two of the patients (the third!) carried off some months after the operation, by the onset of cerebral tuberculosis.

So much for the risk of tuberculous inoculations after operation, a danger I have no wish to exaggerate, which is, I will admit, not very great, but which cannot be denied nowadays,

We will take now the cases called “satisfactory”, those in which cure is obtained by operation; at what price is that cure obtained?

Do the mutilations produced count for nothing?

I do not refer to the loss of power left in children, by operations on the skeleton of their limbs, but solely to the results obtained in those superficial tuberculosis which appear the most justifiable for the knife.

In operating for cervical adenitis, you have avoided the risk of septic infection; and tuberculous inoculation, you have obtained union by first intention, of which you are so proud; but is it then nothing, I ask those surgeons who operate upon cervical glands, is it nothing that you have left that young girl with **horrible cicatrices, persistant stigmata**, which will remain with her, to the end of her days, a cause of infinite sadness, which will "mark" her for ever, will prevent her establishing herself and pursuing a normal existence?

And it is not a question only of fashionable young ladies; how many shop girls and domestic servants who, by the large cicatrices on their necks are prevented from obtaining situations and gaining a livelihood!

Each of us must examine his conscience. We ought to think a little more of those children with Pott's disease who have paid with their lives for the mistake of the practitioner who has opened their abscesses, or even more, of those **young women with scarred necks**, who have paid for that same error with their beauty and their happiness; I believe that the thought would make us accord, in course of time, rather less credit to cutting operations in the treatment of suppurated tuberculoses.

Remember that *tuberculosis does not love the knife which rarely cures, often aggravates, always mutilates.*

2nd **The value of abstention.** Do not be astonished after this, if I affirm that to leave suppurated tuberculoses alone, to do nothing except a good general treatment, is far safer, on the whole, than to operate upon them. In other words, ***systematic abstention is preferable to cutting interference*** at all costs.

And I am not alone in this opinion. Has not a Professor of the Faculty of Paris the habit of saying that, in the presence of superficial tuberculosis, it is better to fold ones arms, than to take up the knife? I have heard recently the same language

at the Orthopædic Institute at Milan, where a surgeon said to me: " At one time we operated upon and scraped every abscess in coxitis and Pott's disease; now, we never touch them, and our patients have gained much ".

Indeed, if one does not touch them, this is what happens :

1st, A large number of these tuberculous suppurations are reabsorbed — nearly half of them, a fact certainly not to be overlooked — and it is true, not only in superficial tuberculouses, but also in abscesses by gravitation in Pott's disease; it is indeed most frequent in the last case.

Nearly half the abscesses in Pott's disease are re-absorbed spontaneously, if you leave the subjects at complete repose with good general treatment.

2nd The others open spontaneously may be, but with spontaneous opening : (a) the risk of *tuberculous inoculation is negligible*, contrary to what occurs in scraping and cutting operations. (b) The risk of *secondary septic infections is less* than in fistulæ following on operative interference, that is to say, fistulæ in which one has disturbed the tissues very much.

This is why the fistulæ which are produced in the neglected children of the country are cured much more often than those which are subjected to extensive and learned surgical interferences, fistulæ which are very often infected at the onset by the operative act.

(c) *Mutilation* is less after spontaneous opening than after operation.

The cicatrix in the neck, which the spontaneous opening of a broken down gland leaves, will never, or scarcely ever, be so unsightly as the large and horrible scars going from ear to chin, or from one ear to other, of which the surgeons are so proud, all the more proud as they are longer.

3rd **Puncture and Injection.** — But let us hasten to say that we have fortunately found something better than abstention to set against the suppurated tuberculosis. If one sins

especially gravely by commission (in operating), one sins also, by omission, in leaving an abscess to open spontaneously. It is necessary not only not to operate upon or to open tuberculous suppurations, but still more to **prevent them opening**, by puncturing them with a fine needle. And we will have already rendered a great service to our patients if we have saved them from the risk of mutilation, septic infection and tuberculous inoculation.

Therefore to do nothing should not be your motto.

There is a better way. If we know how to profit by the presence of the abscess cavity in order to replace the pus by a modifying liquid which will cure rapidly the tuberculous wall (idiopathic abscess), and which, in abscesses by gravitation, will rise up to the source of the pus and cure not only the abscess, but even the affected bone or articulation whence the pus comes, ah! then, it will be truly perfect.

We shall have certainly cured our tuberculosis, more surely than with the best conducted operation, and we shall have cured it in a few months; we shall have cured it without any danger and without mutilation (the most beautiful aesthetic and orthopædic result). Here then is the **ideal** and dreamt of **treatment**, until the anti-tuberculous vaccine or serum has been discovered. Well, this treatment is not a myth, it exists, as we have said: it is that of **punctures followed by modifying injections**, which not only always cure (99 times in a hundred) without risk and without defect, and cure relatively quickly (in 2 or 3 months); but more, it offers the advantages of an inestimable prize, it is very simple and easy; and it may be applied by all medical men, wherever they may be.

This is what one ought not to weary in repeating, until all practitioners are convinced, and until the treatment is included in current practice, as it merits to be.

All medical men will obtain the promised results, provided that they follow exactly the technique we have described. In spite of that technique being easy, there are nevertheless

some details, the minute observation of which is indispensable.

I very often see practitioners who wish to treat by punctures and injections their suppurated tuberculoses and who, being unsuccessful, think themselves obliged, in the end, to open or allow to open, the purulent collection. That happens because their technique is defective. You should follow what I have written, in every detail, in chapter III : it will give you success invariably.

2nd *Dry or fungous tuberculoses.*

The respective value of the three treatments (operation, abstention and injections) is the same for the dry tuberculoses as for those which have suppurated — with this difference however, that in the tuberculoses which have **suppurated, injections** are of far greater value than abstention¹ and extirpation — whilst there remain **some cases** of **dry** tuberculoses where the **conservative** treatment and **surgical** operation may be **contemplated** although they are not, to my mind, to be preferred.

It is not then a question here of proscribing these two treatments but simply of considering them as **exceptional treatments**.

We will proceed to state, in a few words, the exceptional indications.

The value of purely conservative treatment. — This treatment may cure a good number of dry or fungous tuberculoses. It is not we, who live at Berck, who are going to contest this. But it can only be relied upon when the patients are able to live by the seaside or in the country; and when it cures, it is not, generally, until after a long time, three, four, five, six years, and even longer; it is an inconvenience that all those who employ it are obliged to recognize. To sum up, it is **too long**, consequently too costly, to be carried out in all patients.

But especially, it is **too uncertain**. Even under the best

1. Apart from the case of **deep abscess** in **Pott's disease**, where **one ought to abstain** and wait for the spontaneous reabsorption of the abscess.

conditions, it does not cure much more than half the cases, In the other half, the disease progresses, the tuberculous lesion suppurates or goes on indefinitely.

These are sufficient reasons why the "pure" conservative treatment cannot be adopted as a general method of treatment.

It ought to be rejected, particularly when patients of the working-classes are in question, children or adults, and in the case of inhabitants of large towns who are not able to leave their unhealthy surroundings.

It is **acceptable**, on the contrary, for a child belonging to a family in easy circumstances, who comes to us, with a tuberculosis apparently benign, for example, a **hard adenitis**, or a **subcutaneous tuberculoma**. The parents are perturbed at the very suggestion of making the least injection: they declare that they are not in the least hurry, and that the question of duration is a secondary consideration to them. They will arrange for the child to live at the sea-side for any length of time it may be necessary, three years, four years, and more, under any conditions of hygiene and feeding that may be prescribed.

The parents are altogether wrong in dreading injections quite painless, of course; but after all, since they are not always indispensable for recent and benign tuberculosis, we can abstain at the beginning — we can have recourse to injections, when the families themselves have exhausted their patience, or the malady becoming apparently permanent, the proof will be manifest to everybody of the insufficiency of pure conservative treatment in this particular case.

The Value of Operative Treatment. — As to the *Operative treatment* of dry tuberculosis, a treatment which is still unfortunately that of most surgeons, we must not forget that, if it cure sometimes, it aggravates the condition often and mutilates always.

We have already pointed out the sad mutilations caused by the removal of cervical glands. We will take another example.

that of white swelling of the knee. We will not mention amputation, which must be considered as a catastrophe, but only resection.

One ought **always to reject resection for subjects who have not completed their growth**. Everybody will agree that *if it is economic, it is insufficient* to cure the focus, and that it may, among other things, leave a fistula. *Performed extensively, it seriously mutilates* the subject by doing away with the articular cartilage, and that mutilation cannot but be aggravated later on. It is thus that subjects, resected in their childhood, present at manhood 10 or even 15 cm. of shortening.

Although the inconvenience of arresting the growth in an adult does not exist, it remains that, in the adult as in the child, cutting operations performed to get rid of the tuberculosis carry with them the risks of permanent fistula, without counting the slight danger of bacillary generalisation.

Nevertheless, operative treatment is admissible in some special cases, for example that of the **adult workman** suffering with **dry and fungous white swelling of the knee**. There is here no question of growth, which might arrest us in such a case. On the other hand, **this man is obliged** to return to his work. Instead of applying to him the ordinary treatment of modifying injections, which would take from eight to twelve months to effect a cure, very often with ankylosis, we may resect at once; the resection gives us an equivalent functional result, and reduces the duration of the treatment by one half, **provided however, that all goes well**, that is, if after having removed the whole of the contaminated tissues, we have obtained re-union by first intention¹.

1. It would be the same in a case of tuberculous lesion of the soft tissues, easy to isolate, where extirpation can be effected very completely without danger of fistula or visible cicatrix (that is, in an unexposed situation; for example, an axillary or inguinal adenitis, or a subcutaneous tuberculoma in a working man.

But it is still preferable, in the last case, to abstain from all operation and to allow matters to go on, keeping the subject under observation; he might

Outside these exceptional indications, we always fall back upon the injections in the treatment of hard and fungous tuberculoses.

Injections the best Treatment for dry Tuberculoses.

How are injections able to cure dry tuberculoses?

There are two methods of cure of tuberculous lesions : the sclerosing transformation, and the softening, with subsequent evacuation.

The injections act in bringing about one or other of these modifications.

They cure sometimes like the purely conservative treatment, sometimes like the surgical treatment ; that is, by hardening the fungosities, or by liquifying them, by which means their expulsion out of the organism is rendered possible (by means of puncture).

This depends upon the liquid injected.

The first method of cure is carried out by **injections of the “ dry type ”** ; that is, those which do not produce softening ; for example, iodoform and creosote.

The second by **injections of the “ liquid type ”**, those which cause softening of the fungosities and the formation of an effusion ; for example, naphtol camphor.

The injections of the liquid type are most efficacious and certain, because they permit of the complete evacuation of the tuberculous products by the very small orifice of an aspirating needle, without any risk of fistula or tuberculous generalisation which always follows in the train of surgical operations.

It is therefore the most rational treatment, that which accords best with the indications of bacteriology and of clinical surgery : the first calls for the expulsion of the tuberculous products out of the body, the second demands that it should be done without any damage to the patient ; — a treatment which has already been put to the test in several thousands of cases — a treatment, simple, although very minute.

even continue at his work. Either the lesion is reabsorbed, or it softens spontaneously, in which case one would immediately perform the puncture.

Ah, yes! **very minute**; and we ought to repeat as to the injections what we have already said as to the punctures, namely, that the treatment demands, **in order to give the promised results**, to be done according to a perfect technique and not anyhow, as if the liquid, the dose of the liquid, the number of injections, were of no importance. The number of injections may be from 12 to 15 — this means that the treatment is somewhat exacting.

A slight inconvenience, on the whole, if one has regard to the advantage and the results! However, and once again, cure is the prize! And « where there's a will, there's a way ».

We have already given the details of the technique, with all desirable precision, on page 165, and we will return to it *a propos* of the treatment of dry or fungous tuberculous arthritis (page 500) and *a propos* of the treatment of hard adenites and cutaneous or subcutaneous tuberculomata (chapters XVIII and XIX).

APPENDIX

On our Method of Softening artificially the Dry and Fungous Tuberculoses.

(Its Principles ; its Practical Realization.)

I. — *The Question of Principle.*

It is admitted that suppurated tuberculosis is essentially of graver import than dry or fungous tuberculosis. We agree with that¹; but on the other hand, it is certain that we are to-day better armed against suppurated tuberculosis than against dry tuberculosis; so that, in fact, **there is more than compensation**, and, on the whole it would be better to have a cold abscess than a tuberculoma.

1. In spite of the fact that this may not be absolute, nor applicable to all cases (as we have already shewn in our book : *Les Maladies qu'on soigne à Berck*, pp. 70 and 80, to which we refer you for this discussion).

I will explain myself.

A young lady came to me with a suppurating adenitis; this, we know we can cure (with punctures) in a few weeks, completely, without mutilation and without cicatrix.

As a set off, a second young lady came having a "simple" hard adenitis, for which we notice, as happens too often, every thing has been useless; nothing succeeds: neither the sojourn at Berck for a year or two, nor the well-known medicines, nor sclerosing injections of creosote and iodoform. This hard adenitis would not be cured. It remained only to operate upon it, but operation mutilates, operation leaves an unsightly cicatrix which is, in the eyes of the world, the infamous and ineffaceable sign of scrofula.

You see, when all comes to all, the fate of the first young lady, with her cervical abscess, is much more enviable than that of the second, with her hardened gland, so-called more benign.

In the presence of this hard, persisting adenitis, one cannot but regret that it would not suppurate. There would have been, by the fact of its suppurating, more to gain than to lose for a patient treated by a medical man knowing how to make a puncture.

But alas! in spite of all our desires the adenitis would not suppurate at all.

Why not force it to do so? Why not force this tuberculous gland, and further than that, all the hard tubercloses, to soften artificially: synovites, osteo-arthritis, epididymitis, which will not reabsorb? Yes, let us seek for the suppuration of the tuberculomata. That is what we dared to say 20 years ago! — we were told then that it would be madness.

We have prosecuted the practical realisation of our ideas.

II. — *The Technical Problem to Solve.*

Artificial softening of hard tubercloses without injury to the patient is a problem difficult to solve, of which you see very well there are two terms: to act upon the tuberculous lesion with extreme energy, since it is nothing less than making it pass from a solid into a liquid condition, but, however, with extreme precision, so as to limit the action to the gland or the lesion, without ulceration and without visible traces.

In order to do this, we have tried everything.

1°. The local application of **all the remedies** solid and liquid so-called **fondants** and **maturatives**: pommades, ointments, various cataplasms, compresses of sea water hot and cold, thermal and min-

eral waters, balneo-therapy, radio-therapy, electricity in every form. But the results obtained by these means have not been truly satisfactory.

2nd. All the **internal medicines** conceivable : tincture of iodine, Fowler's solution, alcoholic extract of water hemlock, that in particular, because Bazin said so : " in small doses the hemlock may cause the reabsorption of tuberculous glands : or by raising the dose, their softening ". How precious it would be were it true ! Unfortunately, this medicine has not given us the promised results.

3rd. We then attempted, with needles, the **discission** of the gland (as proposed for cataracts) in order to prepare and facilitate its ultimate softening or reabsorption. We tried to **break up** the tuberculoma with fine curettes, with cutting blades in the form of scissors, introduced closed and then opened. But the results were incomplete, and, on the other hand, the passage and manœuvring of these cutting instruments left visible traces on the skin.

4th. **Intra-glandular injections** of innumerable different substances : tincture of iodine, salt water, either mineral or thermal, solution of chloride of zinc, culture of staphylococcus and of streptococcus, previously sterilized, tuberculine (on the advice of Professor Calmette). We have tried to produce the digestion of the gland parenchyma by injections of pepsin and particularly of pancreatine (because this acts in a neutral medium). But it is almost impossible, for instance, to have solutions of pancreatine at the same time quite aseptic and moreover active. Injection of oil of turpentine yields, it is true, about the third or fourth day, some aseptic suppuration, but it is extremely painful and often causes scars. We have injected the whole series of camphorated phenols ; naphthol, gaiacol, thymol, salol, camphor, sulfuricinated phenol, etc., but the injections did not produce softening or they ulcerated the skin.

Finally, that which did best in bringing about the result were the injections already indicated in the chapter on technique, p. 164 ; namely, for the treatment of fungous arthritis, injections of naphthol, camphor and glycerine, and for the treatment of a small tuberculoma and adenites, injections of our **fondant of four liquids**, mixed in equal parts, of sulfuricinated phenol, camphorated phenol, camphorated naphthol, oil of turpentine. You will find on pp. 165 and 168, the method of using the one or the other of these " fondants ".

To **recapitulate** : our method consists in transforming the hard adenites and tuberculomata into small cold abscesses, which are

then punctured : in altering tuberculous arthritis, by chemical curettage of the fungosities on the internal surface of the synovial membrane (the curettage realised by our injections) into hydrarthroses or pyarthroses, which are treated afterwards as common cold abscesses.

Therefore, cold abscess, that enemy formerly so terrible, has been changed by us into a very precious auxiliary, which allows us to predict and ensure the cure of external tuberculoses. And you understand now in what sense we were able to say : When cold abscess does not exist, invent it... create it.

We will return, in the course of this book, to the divers applications of this doctrine, everywhere accepted and applied today ; but we say now, that we have gained the most beautiful results, results which theory promised (see p. 498, Statistics of White Swellings, as treated at our Hospital Cazin at Berck). See also " l'Observation Clinique " in the Appendix to Chap. XVIII (Adenites).

Tuberculous Fistulæ, and Tuberculous Wounds or Ulcers.

What we are about to say here is applicable to **all tuberculous fistulæ**.

As to the peculiarities of each fistula, they will be studied in the chapter devoted to each external tuberculosis (see Pott's disease, white swelling, adenitis, osteitis, epididymitis, etc.).

Fistula proceeds from the opening — **surgical or spontaneous** — of a tuberculous focus. **Fistula is the enemy and the black spot in external tuberculoses : it is the nightmare of all those who are occupied with these affections.**

If we have condemned operative treatment for almost the whole of the cases of external tuberculosis, it is because **operation** so often leaves a fistula behind it.

If we have described with so many minutiae the technique of puncture and injection, it was so that you might be able to **avoid fistulæ**.

For fistulæ are so difficult to cure that the *preventive* treatment remains the best.

It is for this reason that I would have the following inscription graved on the front of hospitals where the external tuberculoses are treated :

« The cure of closed tuberculoses is certain. To open tuberculoses or to allow them to open is to make a way through which, very often, death will enter. »

The *danger of death* may be but slight, except in the symptomatic fistulæ of *deep* osseous and articular lesions (and more particularly in hip disease and especially Pott's disease). But the *superficial* fistulæ themselves are always *troublesome*, not only by the unpleasantness which every persistent suppuration causes, but still more by the mutilations and blemishes which they may leave behind them. For example, the hideous and indelible cicatrices left by glandular fistulæ in the cervical region, without reckoning the risk of inoculation (if it be but small) springing from the persistence of an active tuberculous focus, even when superficial.

Nevertheless, if among fistulæ there are certain which kill, whilst others are merely disagreeable (with, between the two, every degree of gravity) a classification of the different varieties has to be made.

Classification of Tuberculous Wounds and Fistulæ.

1. *Tuberculous wounds and ulcerations of the SKIN.*
2. *Symptomatic fistulæ or lesions of SOFT TISSUES.*
3. *Symptomatic fistulæ of OSSEOUS and ARTICULAR, but SUPERFICIAL, lesions (that is, where drainage is easy).*
4. *Symptomatic fistulæ of OSSEOUS or ARTICULAR lesions, but DEEP (that is, where drainage is difficult).*

1st. Group. — Tuberculous Wounds and Ulcerations of the Skin. — It is a question here of lesions on the surface rather than real fistulæ, for there is not any track leading from the cutaneous opening, or, if sometimes, a sinus exists, it

remains subcutaneous through its whole length, it is a simple

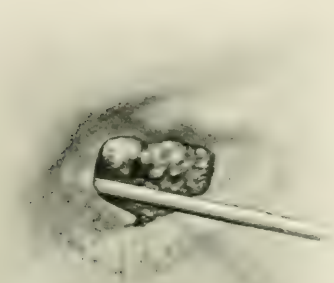


Fig. 177. — Tuberculous ulceration of the skin : a large orifice, with exuberant fleshy granulations protruding; margins of a violet colour, skin delicate, sloughy (a probe has been introduced to raise it); the adjoining tissues are uneven, lumpy.

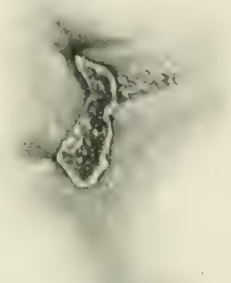


Fig. 177 bis. — The process of cicatrisation; the ulceration is dried, covered with a greyish or blackish crust, which persists; the integument around remains for a long time lumpy and coloured.

undermining of the skin (rather than a true fistulous track).

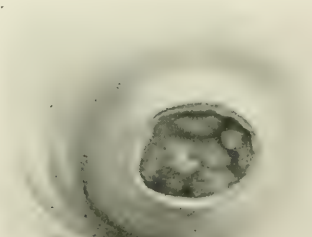
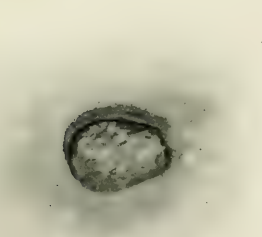


Fig. 178 and 178 bis. — Types of syphilitic gummatous ulceration, surrounded by sharply cut perpendicular edges.

These wounds follow *cutaneous or sub-cutaneous tuberculo-*

mata. You well know the typical characteristics of these wounds, namely : their edges are thin, violet coloured, irregular, undermined, their bases yellowish, with small caseous points or fungosities (fig. 177 and 177 *bis.*).

Whilst syphilitic sores have rounded edges — cut perpendi-



Fig. 179. — Keloid patch in the cervical region proceeding from the opening of sub-cutaneous-bacillary gummata, and sub-axillary ulcers of glandular origin. (The fistulae were produced before the patient's arrival).

cularly — punched out — cliff-like, with a base the colour of ham, or of a gummy appearance (fig. 178 and 178 *bis.*)

But, fairly often, these differential **characteristics** are much **less definite**, confusion is possible between the two, so much so, that there are mixed forms, “*scrofulates de verole*”.

Even while still in the domain of tuberculous lesions, one

can see intermediate forms between bacillary ulcers of the skin and tuberculous lupus.

However, we will have the opportunity in another part of this work (v. chap. XIX) of speaking about tuberculosis of the skin.

2nd Group. — In this group, and in the following ones, it is



Fig. 180. — Ulcers following the spontaneous opening of bacillary glands, which occurred before arriving at Berck. The fistulæ have been cured in three months by injection.

a question of true fistulæ, that is, sores which are nothing more than small craters through which, coming to open through the skin, are tracks and deep cavities, and ending in tuberculous lesions of the soft tissues or even of the skeleton.

The second group is that of fistulæ, symptomatic of lesions of the soft parts.

For example, fistulæ of the neck, of the axilla, of the groin, symptomatic of a *tuberculous adenitis* (fig. 179 and 180). Or



Fig. 181. — Fistulous opening from a tuberculosis of the testicle opened spontaneously; this figure shows the state of the lesion after a stay at Berck. On his arrival, the patient had two other fistulæ on the **right side** of the scrotum still larger and with a graver appearance; we have cured them by the paste injections. Those on the left side « dragged along » but are in a good way towards cicatrisation and no doubt complete cure (without operation). The unusual delay in the cure of these last fistulæ is explained by the co-existence in the patient of Pott's disease and a suppurating costal osteitis. But, in spite of the multiplicity of tuberculous localisations, the patient is so much ameliorated and transformed, that his complete cure is certain and is only a matter of time; about another year's stay at Berck and local treatment.

Let us say on this subject that **all the other** scrotal fistulæ, 65 fistulæ out of 200 cases of tuberculosis of the testicle or of the epididymis (which we have seen during 18 years) have been cured by my injections in a period which has varied from one month to a year. The case here represented has been by far the longest of all to cure. The cure of this patient is to-day complete. (See end of this observation in Additional Notes, p. 1010.)

fistulæ of the scrotum, symptomatic of an *epididymitis* or *bacillary orchitis* (fig. 181).

Or, fistulae of the hand or of the wrist, symptomatic of a *fungous synovitis of the tendons*, or of a *tuberculosis of the synovial sheath*.

The 3rd Group comprises the symptomatic fistulae of tuberculous lesions of the **skeleton**, but superficial lesions, that is, fistulae with short tracks, which can be, consequently, easily and completely drained.



Fig. 182. — Osseous fistulae and deformity resulting from scraping a spina ventosa (the scraping was done by another surgeon).

For example, the symptomatic fistulae of a spina ventosa of the fingers or toes; a tuberculosis of the malar bone, of the *frontal bone*, of the *maxillae*, of the *clavicles*, of the *ribs*, etc.

In this group come again the symptomatic fistulae of super-

ficial osteo-arthritis, that is, almost the whole of the fistulæ of the *elbow*, of the *wrist*, of the *instep*, of the *shoulder*, of the *knee*.

This group also includes a certain number of fistulæ of *Pott's disease*, those which realise, from the point of view of facility of drainage, the conditions aforesaid. namely, fistulæ



Fig. 183. — Post-operative fistulæ following resection of a rib for tuberculosis. Pleural infection consecutive to the operation. (The operation had been performed before the patient's admission to our hospital.)

which open on the neck, or on the back at, a point *very near* to the vertebral focus.

The 4th Group embraces the symptomatic fistulæ of tuberculosis of the **skeleton**, but of a **DEEP** tuberculosis, that is,

fistulæ with a long sinus — where the drainage may be much more difficult than in the preceding fistulæ.

For example, the symptomatic fistulæ of hip disease, the fistulæ of *Pott's disease*, apart from the exception mentioned above.

And, on the other hand, there may be exceptionally placed in this group certain symptomatic fistulæ of white swelling of the knee, of the shoulder, of the wrist, of the instep — namely, those fistulæ which have a long and tortuous track, rendering drainage and the discharge of pus particularly difficult.

Prognosis.

The first three are *curable*, the fourth *not always* — far from it.

Why? It is because fistulæ of the first three varieties are not “infected”, or because their *infection* yields easily to the means of treatment, whilst the fistulæ of the fourth group are *very often infected*, infection super-added and so grave that we cannot always master it.

Therefore, that which constitutes the gravity of a tuberculous fistula is its possible infection; and the first question to put, in the presence of a fistula, in order to establish its prognosis and its treatment, is whether or not it is infected.

Infected you may say it is, when the primitive tubercle bacilli are associated with *septic germs which have come from without*.

The tuberculo-septic pus has been retained — which is somewhat rare in fistulæ of the first three groups, but very



Fig. 184. — Extensive fistulous ulceration communicating with the shoulder joint (the fistulæ existed before the patient's arrival at Berck).

frequent in the anfractuous and deep sinuses of those of the fourth group — pus, I say, will be reabsorbed by the organism, it will cause fever and poison the patient.

If the duration of the retention and absorption is short the patient will recover.

But if it is prolonged, it will lead to a progressive intoxi-



Fig. 185. — The same (back view).

cation of the organism, a real chronic septicæmia with degeneration of the liver and kidneys. And the ending of the infection of the fistula will mean the death of the patient, a consummation more or less distant, which may be measured by months or even several years.

Fortunately, we repeat it, all the initial infections do not end in this way.

We are able to distinguish three degrees or phases in infection.

The first degree is characterised by an evening rise of temperature with morning remissions; the fever has appeared only for a few days or a few weeks; analysis does not yet reveal any trace of albumen in the urine.

The second degree is characterised by the appearance of a



Fig. 186. — Ulceration of the anterior surface of the tibia. The clinical signs on the arrival of the patient, as well as the radiographic examination, suggest almost the diagnosis of osteo-sarcoma (of an osteo-sarcoma, mind you). But the bacteriological examination (by M. Noel Fiessinger) revealed the presence of Koch's bacillus. Cicatrisation is now obtained. See end of this observation in additional notes, p. 1013.

little albumen; and the albumen appears, as a rule, when the fever persists beyond a few weeks.

The third degree is characterised by the presence of a notable amount of albumen and by an appreciable hypertrophy of the liver, which reaches to at least a finger's breadth below the false ribs. Fever may no longer exist at this moment.

Besides these principal signs there are others, those which constitute the symptomatic cortege of slow intoxication of the organism, namely: loss of appetite, loss of strength, wasting, pallor, a yellow or dirty-white tint of the face, fetor of the pus, the appearance of partial or generalised œdema, etc., etc.

As to the **prognosis** of *infected fistulæ*, this differs according to the degree of infection.

The first two degrees are curable, provided that you succeed — by proper drainage — in overcoming the retention of pus.

Unfortunately, perfect drainage is not always realisable in Pott's disease or hip disease; it is for this reason that one cannot pro-



Fig. 187. — Osteo-articular tuberculosis of the knee. The condition of the patient on his arrival at Berck. Lesions extremely advanced, accompanied by profuse and fetid suppuration. General infection of the organism, evening fever, albuminuria, cachexia. Immediate amputation was the last chance (a very small one!) of safety to resort to; the parents refused. The little patient returned to his home and succumbed in two months.

mise, in an absolute way, the cure of an infected fistula, even of the first degree, symptomatic of hip disease or Potts' disease.

Sometimes the fistula will progress, in spite of all our efforts, to the 3rd degree.

And, in the third degree, the disease is without remedy, or pretty nearly so, when albumen exists in notable quantity; when the liver extends two fingers' breadth beyond the costal margin, it is too late. Then, even if one drains extensively, even if one succeeds in producing a fall in the patient's temperature, the visceral lesions will continue to progress to their full extent and will finish by carrying off the patient... always or nearly always.

The Treatment.

Every six months you will hear vaunted a new treatment, so-called marvellous, of tuberculous fistulæ.



Fig. 188. — Operation sores and fistulæ resulting from surgical interference in a case of hip disease with a closed abscess. The patient had no fistulæ before the operation, which ought to have been, according to the promise of the surgeon, « a radical cure »; it has left 23 fistulæ (existing since the operation). We have already closed 14 with our injections. Ten months later only three insignificant fistulæ remain; the weight of the patient has nearly doubled. (See this observation in « Additional Notes », p. 1014.)

All these treatments, new and old, may be arranged in four groups : *surgical operation*, *abstention*, *physio-therapeutic treatments* and *injections*.

a. Operation. — For a good number of surgeons (for the greatest number, I should say) the only rational treatment of tuberculous fistulæ remains, today as yesterday, surgical operation, an operation which they perform very extensively and which they repeat without wearying.

Certainly it appears, *a priori*, logical and rational. But in fact and in practice, experience has proved to us that operation



Fig. 189. — Another case of post-operative fistulæ. This patient arrived at Berck in this condition with fever, albuminuria (8 or 10 grammes a day) large liver, general cachexia; he lived two years longer. He succumbed lately after an uraemic crisis.

has done twenty times more harm than good. Instead of destroying by a single stroke the tuberculous focus as had been hoped, one might say, as a general rule, they stirred up the focus and thereby opened up tissues which until then were sound; it does not cure the patient, it mutilates him.

I say nothing of inoculation far away in the meninges or in the viscera, and of tuberculous generalisations, which operations may bring about.

Recall our aphorism : *In tuberculosis the knife rarely cures, it often aggravates and always mutilates.*

At the commencement of my practice, I operated and re-operated upon hundreds of fistulæ ; I obtained, doubtless, some

cures, but many more aggravations. So much so that I treat them today by the conservative method; I operate no longer: all that I do now as interference, if it may be called a real



Fig. 190. — Fistula communicating with a deep, bony focus (Pott's disease in lumbar region); the fistulous orifice was found within four inches above the centre of the left iliac crest; an injection of very soft iodoform paste before the photograph was taken shows the different diverticles of the collection. — T. Tampon obstructing the fistulous orifice. — I. Focus and principle cavity of the abscess filled with iodoform liquid. — P. P. P. Secondary pockets. — one of these descends, on the right side, down to the internal iliac fossa; one conceived that there was very poor assurance of perfect drainage with a sinus so anfractuons. If fever appears, or if the cure takes too long, a counter opening will be indicated at the lowest point.

interference, is, in the **extremely rare case** where I find by examination of the sinus a **mobile sequestrum**, to **extract it** — **without doing more**, without touching the sinus.

The cures effected by my conservative treatment today are incomparably more numerous and more beautiful than those obtained by my treatment by operation years ago.

The question has been settled, the only treatment of tuberculous fistula should be conservative.

You may rely on our very great personal experience of the two methods.



Fig. 191. — These fistulæ, of three years' standing, proceeding from a tuberculous pleurisy (empyema) have been cured by a single injection of our naphtol paste.

Once again, do not allow yourself to be troubled by the thought that there will be small sequestra, an objection which will often be made to you by the advocates of "operation at all costs".

First, sequestra here are very rare. I have said so, but supposing they do exist, it is in the two following conditions :

Either (a) you find the sequestrum already *completely detached, easily accessible* and it is evident, as we have said, that you can and ought to seize it with the forceps, just as you would any foreign body; but be contented with that; you can do it without anaesthesia and without causing hæmorrhage.



Fig. 192. — Fistulæ proceeding from hip disease; these fistulæ, of eighteen months' standing, have been dried up by six injections of our paste in the space of two months.

Or, (b) the sequestrum is not mobile or is not easily accessible; well, abstention, in that case, would be better than operation.

For sequestra are worn away and eliminated by the aid of injections, and even spontaneously in the long run, nearly always.

In abstaining, you observe the *primo non nocere*. Whilst operation will not be without danger.

a) For if you have recourse to a very extensive cutting interference, so-called radical, you run much risk of spreading

(in place of limiting) the region pertaining to the tuberculosis ; it will produce new sequestra and the only result of the operation will be an aggravation, a mutilation. The patient will be mutilated, even when the tuberculosis is superficial.



Fig. 193. — Symptomatic crural fistulæ in a case of dorso-lumbar Pott's disease. The fistulæ which had existed a year and a half were cured in four months by our paste injections.

For example : if you curette a finger affected with spina ventosa, to be quite certain you have reached the limits of the disease you will have to go beyond it and cut into sound tissue ; you will unavoidably go too far, and thus the patient will come away from the operation more mutilated than if he had waited for the **spontaneous elimination of the deepest**

osseous debris present. Nature, in the end, will manage things much more economically than the surgeon.

b) Abstention. then, is of more value than surgical operation. That is, a patient placed at rest, in the good air of the country, and especially near the sea, with good general treatment and no other local treatment than good aseptic dressings, has much more chance of seeing his fistulæ close than by operation. That is to say, again, that the country practitioner who never operates, will cure a greater number than the great surgeon who always operates and obstinately re-operates. But I am teaching you nothing : have not every one of you seen a great number of those fistulæ cured, which had never been touched?

c) Physio-therapeutic Methods.

What has not been tried, since Bier's method¹, the X rays, sunlight cures, violet rays, radium, up to sea bathing at all our shores of the Nord and of the Midi, and salt baths, either mineral or thermal, at all the reputed stations : Salies, Kreuznach, etc., etc. These medications are not without

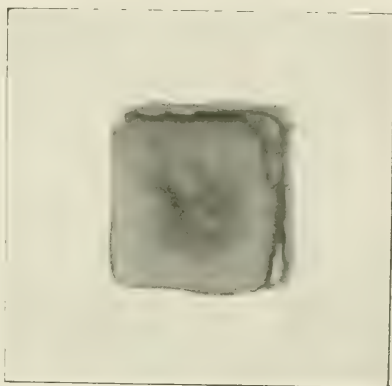


Fig. 194. — Pott's fistula situate in the proximity of a focus. It was a dorso-lumbar Pott's disease; the fistulous orifice was 6 centimetres without and to the right of the spinous apophysis of the second lumbar. The fistula was treated through an opening in a plaster apparatus; it dried up after five injections of our paste in about two months. The cicatrised fistula is seen here through the opening in the plaster corset which the patient still wears.

1. Bier's method, of which I have said that it has no action against the bacilli, may act favourably against staphylococcal or streptococcal infection.

value, they may succeed in very superficial fistulæ, and especially in ulcerations and tuberculous sores on the surface, acting by improving the general condition of the patient,

I have tried all these medications, which have sometimes



Fig. 195. — Another case of cured fistula in Pott's disease. The patient, aged 52, had a large abscess in Petit's triangle. The abscess had been punctured and injected already three times when the patient was obliged to leave Berck and suspend the treatment for several weeks. On his return, the skin was of a violet tint, almost black at two places and a few drops of pus issued through orifices of the calibre of a pin. It was impossible to avert the opening which occurred in about two days by the giving way of two small scars in the skin; we recommenced our injections; the sores were closed again in about four weeks and have remained so. (This was over six months ago.)

effected a cure, but infinitely less frequently than the medicated injections I am about to describe.

d) The modifying injections, made with the liquids indicated, and in the manner described on p. 170. With these injections cure may be obtained almost always, even in the

osseous fistulae, provided they are not infected and provided that one does not neglect any of the general indications given.

We may now indicate the treatment of each variety of sore, or tuberculous fistula.

1. The Treatment of Tuberculous Sores and Ulcerations.

They are cured with various **topical** remedies, varying their use : the application of our powder¹, tincture of iodine, peroxyde of zinc, compresses soaked with iodoformed creosote oil, camphorated naphthol with glycerine, permanganate of potash, the application of Vigo plaster (fresh), nitrate of silver, the thermo-cautery, the galvano-cautery, dressings of oxygenated water or naphthalan.

Physio-therapeutic treatment. X rays, and high frequency currents (these two may hardly ever be used except by specialists), exposure of the sore to sunlight, proceeding gradually and methodically, sometimes sea-baths, salt baths.

In cases somewhat refractory, I have made a circle of modifying injections all round the tuberculous sore (injections of creosoted oil or of naphthol-camphor).

2. Treatment of Fistulæ in the Second Group.

(Symptomatic Fistulæ of Tuberculosis of the Soft Tissues.)

Make small injections of oil, creosote and iodoform, or of naphthol-camphor, but making provision for keeping the liquid in position. If the liquid is not easily kept in position, use our paste according to the technique and dosage you already know (p. 176).

1. See the formula of our powder, p. 162.

3. Treatment of Fistulæ of the Third Group. (Osseous Fistulæ with Short Sinuses.)

Make the same injections and in the same manner as above.

4. Treatment of deep Fistulæ. (Hip Disease, Pott's Disease.)

a. If they are not infected, if there is no fever, no albumen, make modifying injections as above.

b. If they are infected, with evening fever resulting from the retention of pus, try to suppress retention by simple drainage. If you do not succeed thus, avoid the injections. Avoid still more carefully the temptation of extensive surgical interferences, so-called radical, which have twenty times more chance of injuring the patient than of improving his condition. Confine yourself to a treatment, perhaps more modest, but incontestably better, which is: ensure the rest and immobilisation of the affected part with fenestrated plasters. asepsis of sores as perfect as possible, and now and then attempt discreetly, and for a short while, some of the physiotherapeutic methods. In addition, a good general treatment. The general treatment, so important here, comprises life in the open air, in the country, or better still at the sea-side; a well-directed dietary, which includes plenty of milk; and thus you may be able to prolong the patient's life for several years, sometimes you may cure him. We have cured some in this way, even cases of extreme gravity, and we have witnessed veritable resurrections. One must never despair.

But too often, however, we remain powerless, and death will be the usual termination of these profound infections in hip disease and more especially in Pott's disease. And for that reason, I can never repeat too often the fundamental dogma of the treatment of external tuberculosis “ *Never open, nor allow to open, the tuberculous foci.* ”

CHAPTER V

POTT'S DISEASE

The objective should be to cure without gibbosity.

In order to cure, do not open the abscess.

To cure without gibbosity, make good plaster corsets.

A reminder of some Anatomical and Clinical Points indispensable in treating Pott's Disease.

Pott's Disease is a tuberculosis of the vertebral column. The lesion is situated in the anterior part, in the **bodies** of the vertebrae (fig. 196 to 199).

Five Cases. — *First Case.* Before a gibbosity has appeared (fig. 196). Like all the white swellings, Pott's Disease goes on for some time, several months and even one or two years, without deformity or gibbosity¹. It may remain unobserved, but generally it makes itself known by some radiating or local pains, intermitting, or by a functional weakness, caused by reflex muscular contractions: defective walking, difficulty in stooping, rapid fatigue, etc.

Second Case : Gibbosity (fig. 197, 198, 199). Second period of the disease.

1. Pott's disease may even *never* present a gibbosity, but that is infinitely rare in children, a little less rare in adults.

But we rarely see children at the first period. **Most often**, when they are brought to us there is **already** a **gibbosity**. This is

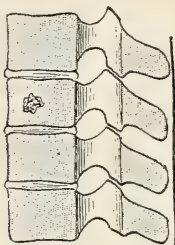


Fig. 196. — Pott's disease *before gibbosity*, a tubercle has appeared in the centre of the body of a vertebra; around this, a zone of rarefaction and softening favouring its extension.

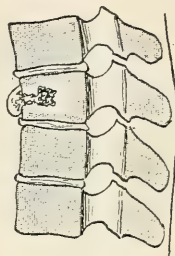


Fig. 197. — *Beginning of the gibbosity*. The tubercle has progressed, perforated the anterior wall of the body and produced an abscess; the vertebral body collapses, hence the gibbosity is produced behind.

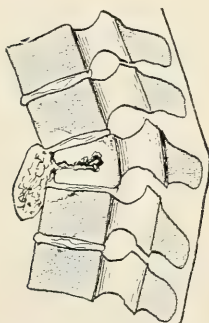


Fig. 198. — *The gibbosity accentuated*. The tuberculosis has progressed from one vertebra to the others above and below, which are beginning to soften and to sink.



Fig. 199. — *The gibbosity has progressed* at the same time as the anterior lesion. Of the first diseased vertebra only the posterior arc and an insignificant part of the body remain. What is left of it is by degrees pushed backward by pressure of neighbouring vertebrae, as is the stone of a cherry when you squeeze the fruit between your fingers.

produced : a) by flexion of the spine; b) by the collapsing of one or two bodies of vertebrae, softened by the ravages of tuberculosis; c) sometimes by sub-luxation of the two spinal segments.

At the outset, the gibbosity is angular, in the middle line, and painful on pressure.

The figures 197, 198 and 199 shew how a gibbosity is produced. It progresses: later on appear adaptations, that is, secondary deformities of other parts of the spine, and even of the thorax, of the pelvis, of the head, all



Fig. 200. — Last stage of a gibbosity. The patient has become a hunch-back (when he has not been treated or not well treated.)

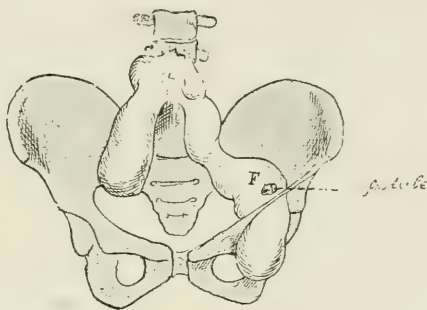


Fig. 201. — Abscess and fistula in Pott's disease. Abscess by gravitation in the iliac fossa. On the left, an abscess has travelled down to the thigh, passing in the shape of a wallet, beneath the crural arch. F. Orifice of a fistula above the crural arch.

deformities which contribute to giving to the humps their character-

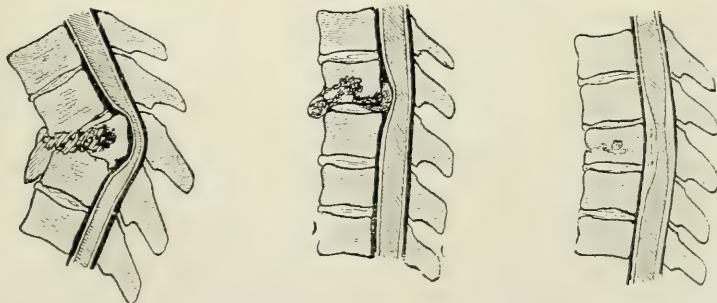


Fig. 202 to 204. — The three principal causes of paraplegia. Compression of the cord.
1st by a projection of bone. 2nd by an abscess. 3rd by pachymeningitis.

istic outline (v. fig. 200).

The gibbosity is generally less in Pott's disease of the cervical and lumbar regions than in the dorsal region.

Third Case : Abscess. — *Fourth Case : Fistulæ* (fig. 201). — The bacillary focus does not remain localised in the bodies of the

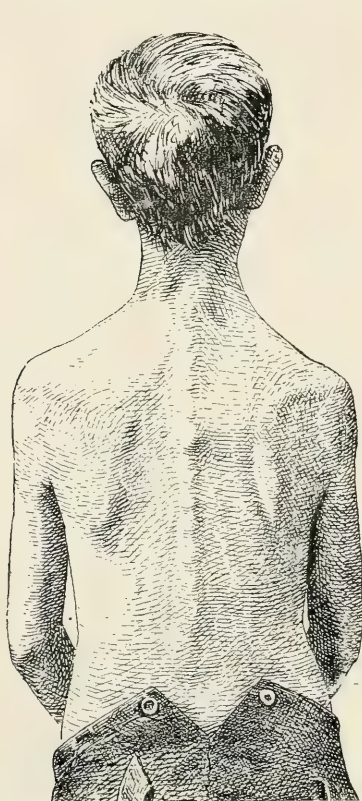


Fig. 205. — Pott's disease from its commencement. Slight projection of the spinal apophysis of the sixth dorsal vertebra.



Fig. 206. — Gibbosity at the fifth dorsal (at the beginning).

vertebrae : it may invade the neighbouring soft parts and send prolongations of fungous granulations more or less far towards the neck, the thorax, the back, but *especially* towards the lowest parts : internal iliac fossa, root of the thigh ; — and the softening of these granulations constitutes the abscess by gravitation of Pott's disease.

These abscesses, rare in Pott's disease of the upper dorsal region, are more frequent in Pott's disease of the cervical region, and almost constantly present in lumbar and dorso-lumbar.

They may go to the length of ulceration and breaking down of the skin, whence the formation of *fistulae* which are so easily infected : this infection is very grave, leading to the degeneration of the

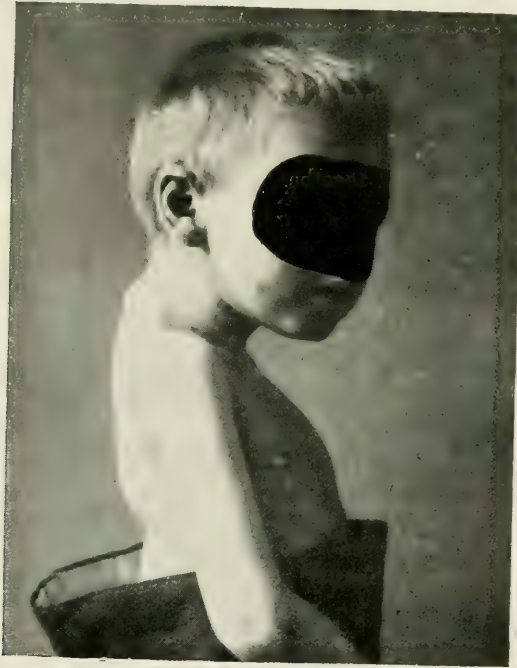


Fig. 207. — Ordinary type; median and angular projection; the attitude in cervical Pott's disease.

liver and kidneys and is very often fatal. — **Fistula** is the **greatest danger** which menaces the life of these patients.

Fifth Case : Paralysis (fig. 202, 203, 204). — The fungous prolongations may be directed also towards the spinal cord. The compression produced by the abscess (fig. 203) will then give rise to a paralysis more or less complete. The paralysis may be due also to a projection of displaced bone (fig. 202) or to a propagation of the tuberculosis to the meninges and cord (fig. 204) or to some trouble of the vascular or lymphatic circulation in them.

As is the case with gibbosity, paralysis is more frequent in Pott's disease of the dorsal and cervico-dorsal regions than in Pott's disease of the two extremities of the spinal column. It is the reverse with abscesses.

Of the three great symptoms, gibbosity, abscess by gravitation, paralysis, the first (gibbosity) is nearly always present; abscess



Fig. 208. — Ordinary type; median and angular gibbosity.

exists in about half of the cases, and paralysis only once in 5 or 6. — The three may exist together, but this is very rare. Generally

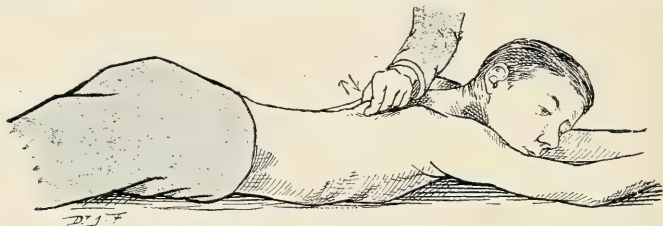


Fig. 209. — Looking for pain. Succussion: one seizes between the thumb and fore-finger, the spinous process of the projecting vertebra, pressing upon it with short and quick lateral movements.

when an abscess is apparent, there is no paralysis, and vice versa; on the other hand, gibbosity generally co-exists with abscess or with paralysis.

Prognosis.

This differs entirely according as the disease is treated or not.

A. If the disease is not well treated :

a. The *gibbosity* will develop more and more, and the patient, if he survive, will remain hunch-backed.

b. *Abscesses* are more frequent, more bulky : but especially do they produce fistulæ. And fistulous Pott's disease nearly always ends with the death of the patient, sooner or later.

c. *Paralysis* is equally more frequent and is often fatal.

B. On the other hand, if the Pott's disease is being well treated :

The *gibbosity* if recent will be not only arrested in it's progress, but effaced.

Abscesses will be less frequent : above all things, they will cure because they will not be opened or allowed to open.



Fig. 210. — Dorso-lumbar Pott's disease; typical attitude.

Paralysis will be very rare and, if it supervene, will be cured 19 times out of 20.

Duration of the Disease.

The duration depends especially upon the treatment carried out, and slightly upon the particular case, because the tuberculosis may be more or less virulent. On an average, it is necessary to reckon from

three to four years, sometimes less, often more. In the case of **abscess well treated**, the duration of Pott's disease, instead of being prolonged on account of the abscess, is notably shortened.

Diagnosis.

The ordinary case. *A child is brought to consult you about a gibbosity. Three times out of four one has only to look at it to see*

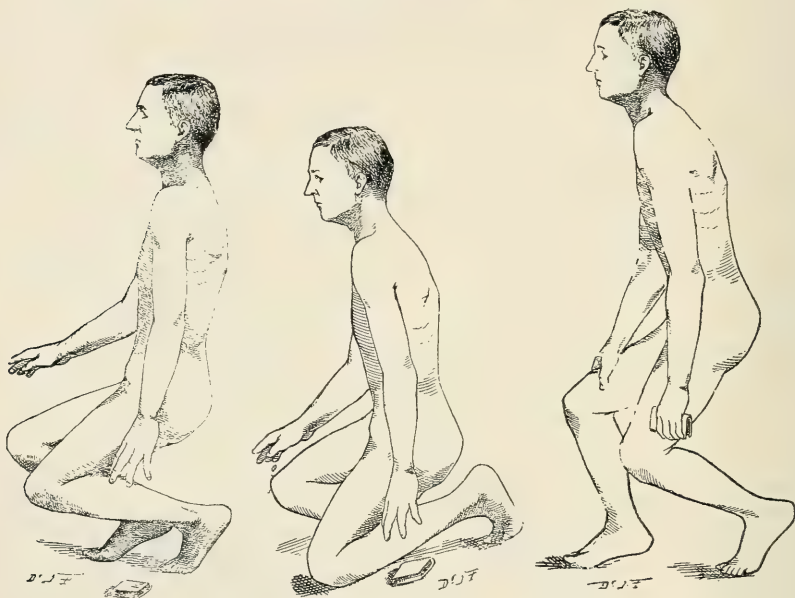


Fig. 211, 212, 213. — The patient is asked to pick up an object placed on the floor.

1st stage. The patient flexes his knees instead of freely flexing the trunk. He uses his right arm to balance himself in order to preserve his equilibrium.

2nd stage. The left knee is in contact with the ground, the left hand seizes the object.

3rd stage. The patient raises himself by means of his right hand, which takes a point on the thigh as a fulcrum.

that it is due to Pott's disease. Indeed, if the parents bring the child to you, it is because they are concerned at the appearance of a prominence in the middle line of the back, and they want to know what it is.

How one recognises the gibbosity of Pott's disease.

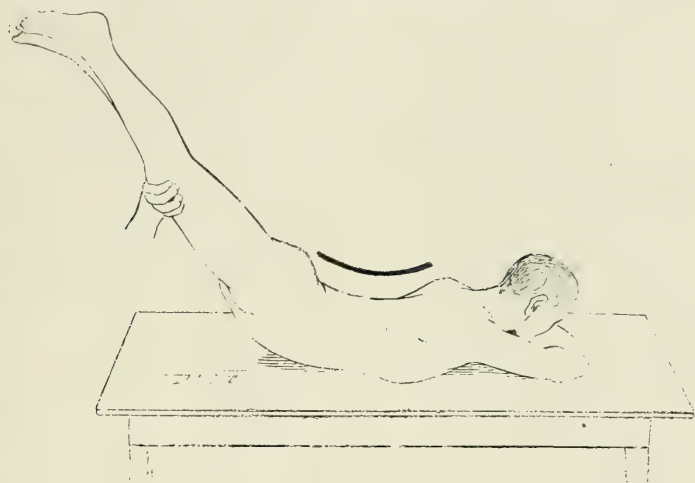


Fig. 214. — Examining the mobility; healthy subject. In hyper-extension, the entire spinal column participates in the movement and forms a regular curve.

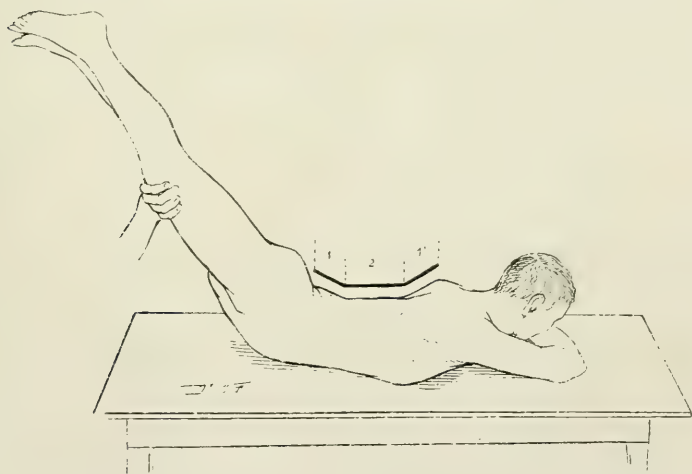


Fig. 215. — In the affected subject, the diseased segment (2) presents rigidity and the spinal column forms a broken line, 1, 2, 1'.

(fig. 197 to 209). We have already said it : It is **median** (over

one or two spinous apophyses), 2nd. it is **angular**, 3rd. it is **painful** on **pressure**, and **especially** on lateral **succussion** (fig. 209).



Fig. 216. — Lumbar Pott's disease; there is no gibbosity strictly speaking, but the physiological lordosis has disappeared, that is sufficient. — Here the diagnosis was confirmed a month later by the appearance of an abscess in the left iliac fossa.

Moreover, the attitude is "**stiff**" (fig. 205 and 219) and there is **rigidity of the spinal column**. — The patient walks **all in a block**, without any flexibility (fig. 210). In order to **bend down** and

pick up an object on the ground, he **does not bend the trunk** freely : he **flexes the legs** and kneels down rather than stoops (fig. 211, 212, 213). If one raises up the two limbs and the pelvis of the subject **laid on his belly**, the back does not bend in the customary way : it resists like a board (fig. 214, 215).

Finally, the general condition is often below par, and the ordinary antecedents of tuberculosis may be found.

LESS FREQUENT CASE. *No gibbosity has appeared.* — Once out of four times you are consulted only for functional troubles ; **nothing is mentioned as being wrong with the back.** It is for you to **think of it** and examine the spine.

a. When a child is brought to you carrying himself badly (fig. 210), is quickly fatigued, complains of a stitch in the side, or **girdle pains**, or **pains in the limbs**, diurnal or nocturnal, never neglect to completely examine the patient perfectly nude, and to carefully inspect the back and the lower limbs.

If you find a **gibbosity**, the diagnosis is easy.

Failing that, if you find **pain** on succussion, **stiffness** in walking, difficulty in stooping, these will **suffice** to make a diagnosis of Pott's disease.

b. Sometimes the patient is **brought to you only for an abscess** — *cold paravertebral* — (in the neck, the back, the thigh, or the internal iliac fossa). Think of Pott's disease and examine the back. Bilateral symmetrical abscess is an indication of Pott's disease 99 times out of 100 : but unilateral abscess should also make you think of it.

c. More rarely, *it is for paralysis that you are consulted.* Think here again of possible Pott's disease, and look for the different signs which have been given you about that.



Fig. 217. — Rare type ; pseudo-scoliotic form. An iliac abscess shortly confirms the diagnosis already made of Pott's disease.

Differential Diagnosis and Causes of Error.

With what can it be confused?

a. *The gibbosity.* — If this is very slight, and situated at



Fig. 218. — Another rare type; median gibbosity, but no angularity.
The tuberculous round back.

the seventh cervical vertebra, **do not forget the prominence nor-**



Fig. 219. — A rare type, of the same kind as in fig. 218; Pott's disease of the
kyphotic form; median gibbosity, but not angular.

mally made by the seventh vertebra, called, for this reason, the

prominens. In the normal condition, there is no pain, no stiffness, etc.

It is the same with the **tenth dorsal**, which **often** presents a **slight (normal) prominence** of a few millimetres.

On the contrary, **the lumbar and cervical regions are normally**

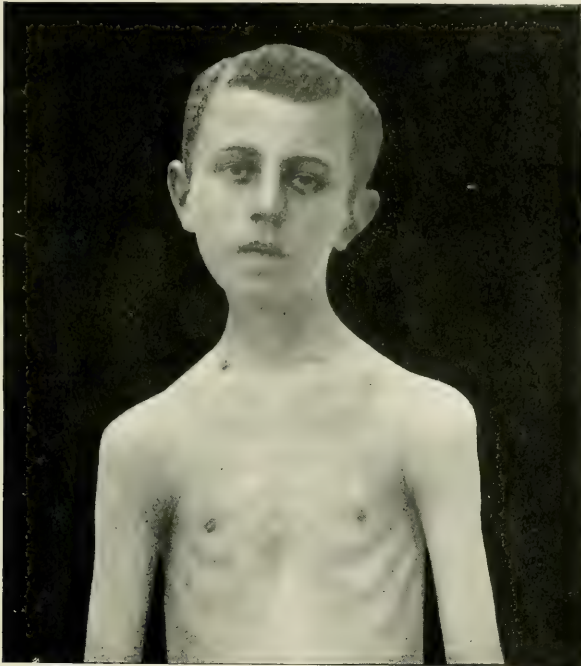


Fig. 220. — Cervical Pott's disease; — left torticollis and fistula on the right, in the sub-clavicular hollow. He came to Berek with a diagnosis of suppurative cervical adenitis, which had been opened. We recognised Pott's disease by pain on pressure over the third cervical vertebra, stiffness of the neck, and by a retro-pharyngeal abscess (see fig. 221), communicating with the fistula.

concave. One ought, then, when they appear flat (fig. 216),³ to think at once of Pott's disease, and look for the other signs : pain, stiffness, etc.

Scoliosis sometimes presents a median knob, but this is nothing compared to the two lateral curvatures in the opposite direction which are below this median knob.

It will be well, however, to **reserve our diagnosis**, if at the same time there is a lateral curve, and **marked pain over a spinal apophysis**; because one has seen Pott's disease assuming the scoliotic form (fig. 217).

The round back is a non-tuberculous deformity (v. chap. ix).

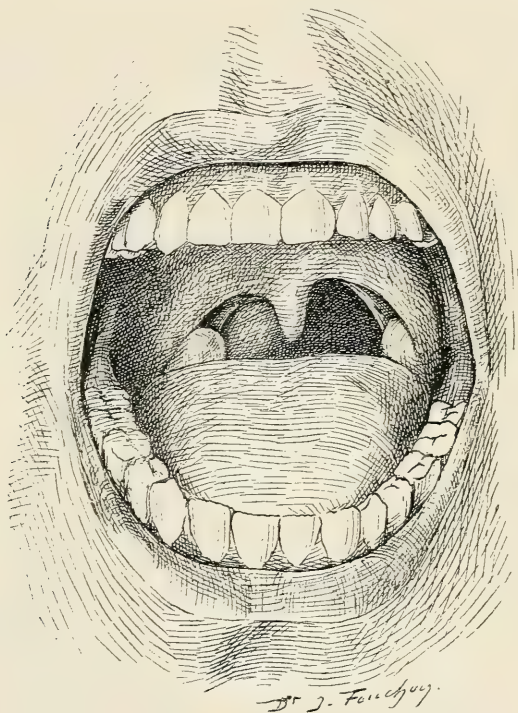


Fig. 221. — The child in fig. 174; abscess pushing up the right side of the pharynx. Uvula pushed to the left, right edge of soft palate pushed down.

Nevertheless, Pott's disease may sometimes present, instead of an acute gibbosity, a regular curve of several vertebrae (fig. 218, 219), **a round back**, which is then **painful and stiff**, with a poor general condition. **These characteristics ought to make one think of Pott's disease**, or at least to make one reserve the diagnosis¹.

1. For the diagnosis of **rachitic** kyphosis, v. p. 634.

But be reassured, because it is rarely that Pott's disease appears under the form of lateral deformity or of round back.

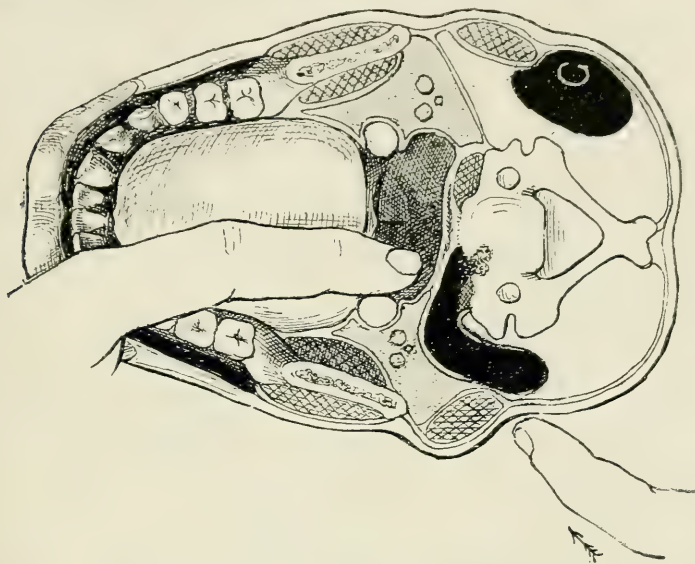


Fig. 222. — Touch often allows one to distinguish an abscess *by gravitation* in the neck from an idiopathic or glandular abscess. If it is a pharyngeal abscess of vertebral origin; a finger laid on the posterior border of the sternomastoid and exercising light but jerky pressure over the deep tissues, will convey the impression of fluid to the index finger introduced into the pharynx, on the left. This sensation would be absent in the case of glandular abscess (c) on the right.



Fig. 223. — The method of palpating the internal iliac fossa in looking for an abscess; the pulps of the fingers are firmly pressed into the abdominal wall, pushing aside the intestinal mass.

Gibbosity following accident : the diagnosis is by the history

of very grave injury, by the sudden appearance of the deformity, with general medullary symptoms, etc.¹.

b. Abscess. — Causes of error in diagnosis.

If there is **behind the pharynx a cold abscess, one will always think of Pott's disease.** One will examine and palpate the corresponding spinal apophyses; one will look for antecedents, *torticollis*, intermittent or chronic, radiating pains about the neck, the arms, etc., in such a way as **not to mistake a Pott's disease for**

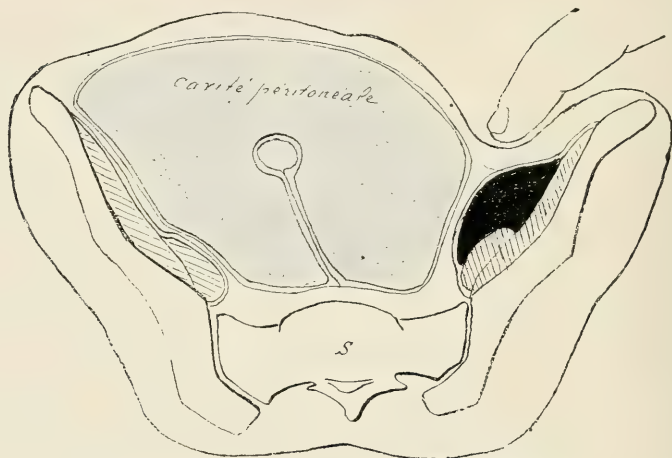


Fig. 224. — Palpation of the iliac fossa; the hand, in pushing aside the intestinal mass, comes in contact with the wall of the abscess.

a simple idiopathic retro-pharyngeal adenitis. **Cervical adenitis** is distinguished from abscess by gravitation (of the neck) by the same signs (fig. 220 to 222). When an abscess is situated in the right iliac fossa (fig. 223 and 224) take care not to confuse this with a cold **appendix** abscess, an error which I have seen committed.

One will distinguish it also from an encysted collection of **peritoneal tuberculoses**, from a simple **glandular abscess**, and especially from an incomplete **hernia**, an unfortunate mistake I have seen made (v. chap. XIX).

1. Syphilitic gibbosities are rare; they are rather of a mixed form, a « scrofulate de verole », v. chap. XXI.

The **diagnosis** with spondylitis deformans and other ankylosing arthrites of the spine, by the existence of a large curvature, of generalised ankylosis of the spine, frequently stiffness of the joints at the root of the limbs, etc.

Here again, **the diagnosis may be made by examination of the back**, which one should never neglect in such cases.

c. **Paralysis** of Pott's Disease.

This may be confused sometimes with **myelitis, syphilitic** or



Fig. 225. — A child shewing the diagnosis of right hip disease. He had a right iliac abscess with dorso-lumbar Pott's disease at the beginning (without hip disease).

alcoholic, and sometimes even with **infantile paralysis**, or the **paralysis of cerebro-spinal meningitis**. You will avoid this confusion by examination of the back, analysis of the other signs¹, and by the history, different in each diverse malady.

1. In the paralysis of Pott's disease, the reflexes are **exaggerated** from the beginning (always or nearly always). Later, spasms and contractions, troubles of sensation, of the sphincters, and trophic lesions (bed-sores), etc.

Diagnosis of Pott's Disease with some other Maladies.

I. With Hip Disease. — When a child comes to you for functional troubles only, that is, a defective attitude (fig. 225), or a halting gait, it is necessary to examine successively the back and the hip, (even the knee), in order to discover if limitation of movements and pain on pressure over the bones, etc., etc., is to be found in the hip (hip disease), or in the spine (Pott's disease)¹.

2. With vertebral Rheumatism. — If the rheumatism is very chronic, distrust it! **How many cases of Pott's disease have been decorated with the name of Rheumatism (or of Sciatica) until, sooner or later, a gibbosity or an abscess becomes conspicuous to the eyes of the practitioner or of the patient's friends.**

THE TREATMENT OF POTT'S DISEASE ²

We are going to describe : I. What ought to be done ;

2. How it must be done.

1st PART. — WHAT OUGHT TO BE DONE.

This depend upon the case. — Five Cases; 1st no gibbosity, no abscess, no paralysis; 2nd gibbosity; 3rd abscess; 4th fistula; 5th paralysis.

1st CASE. POTT'S DISEASE WITHOUT GIBBOSITY

It may happen, in patients who have been very well looked after, that they come to you before the appearance of any gibbosity. It is rare.

A. Therapeutic indications. — To favour the cure of the tuberculous focus and to prevent the gibbosity occurring.

B. The Treatment comprises two things³.

1. Hip disease and Pott's disease may co-exist.

2. We are only dealing here with local treatment — because we have nothing to teach practitioners on **general anti-tuberculous treatment indispensable for all those patients**, namely, good hygiene, over-feeding, medical treatment, and especially open air treatment (such as our patients at Berck enjoy, **out of doors from morning until evening and in all weathers**).

3. These are evidently applicable *to all cases* of Pott's disease, during the period of activity of the disease.

I. Rest in the recumbent position.

II. A Plaster apparatus.

1. **REST.** — Place the patient at rest in the recumbent position, for one and a half or two years.

2. **THE PLASTER APPARATUS.** — You should apply this at the beginning, during the period of rest, and the patient should continue to wear a corset after getting on to his feet, for two or three years longer, at a minimum, which make, in all, from four to five years; in a word, he will not leave it off until the welding of the vertebræ is accomplished; in the same way, in a fracture, one keeps to the plaster until after the formation of a solid callus.

Necessity of the Plaster apparatus. — No one seriously disputes the necessity of rest in the recumbent position during the whole period of activity of Pott's disease; but it is not so with regard to plaster apparatus.

Why not rest only? they say. Or a Bonnet's splint, or the "cadre" with or without extension?

Why?... Simply because all these other treatments are not to be depended upon and are insufficient. They do not give good results, especially with children.

Here is, *as to simple rest*, the opinion of Lannelongue: "One sees in Pott's disease gibbosity produced and aggravated in spite of horizontal decubitus. I could quote a respectable number of clinical instances where gibbosity has continued to progress in spite of decubitus very strict and of long duration."

Passing on to the value of *splints*: "I have seen at Berck-sur-Mer", says another surgeon, "gibbositities beginning and augmenting in splints". And Lannelongue on the same topic says, "Oftentimes, when the child is taken out of the splint, he is deformed".

These quotations exempt me from bringing forward personal observations upon numerous patients I have seen, treated elsewhere in this way, in whom were produced gibbositities more or less bulky.

Moreover, that would astonish only those who have forgotten that **every case of Pott's disease is a fracture** (pathological) of the spine, already produced or very imminent, with a very marked tendency to the overlapping of the fragments.

It is necessary to prevent the displacement of the two fragments.

It is easy to understand that **rest alone is not sufficient for this. Success can only be obtained with certainty by the use of a large plaster**, which will support very exactly the two segments of the spine,

Do not, then, hesitate to apply it immediately. Hesitation is so much the less permissible seeing that **the treatment by plaster** is not only by far **the most efficacious**, but is, all things considered, **the most simple and most practicable for everybody** : parents, patients and doctors. The other treatments : splints, extension frames, special beds, plastered beds, etc., corsets made of duck, with rest on a board, *in spite of their apparent simplicity*, are, when one reckons up everything, much more complicated, more difficult to apply and look after, and much less comfortable for children.

2nd CASE. — POTT'S DISEASE WITH GIBBOSITY

(much more frequent)

A. — *Indications for Local Treatment.*

I. To arrest the growth of the gibbosity. II. **Correcting it if possible.**

Is this correction logical? Yes.

It has been disputed. It has been vehemently denied. But we have **today the clinical and radiographic proof of its correctness**¹. It will be sufficient to cast your eyes on the

1. See, in *La Clinique* of July 20th, 1906; *Pourquoi l'on peut et l'on doit redresser les maux de Pott*, par F. Calot. Do not lose time; take care not to allow a gibbosity to increase. At this moment there is scarcely more than half a vertebra ravaged by tuberculosis. Later, after one or several years, when 3, 4 or 5 vertebral bodies have been destroyed, you will not be able

figures following for you to be convinced. (Fig. 226 to 241.)

They demonstrate that **the dorsal gibbosity has been effaced at the same time that the spine has been welded in front.**



Fig. 226. — Abel L., rue des Récollets, Valenciennes. There was a gibbosity on his arrival at Berck at the age of four years in 1898 (see fig. 227 and 228 shewing the child straightened).

If the thing has been possible for certain bulky gibbosities, with all the more reason will it be possible in **small** to do much; the treatment will then have to be handed over to a specialist, who will not be able, at this stage, to obtain a perfect cure.



Fig. 227. — The same redressed — 8 years afterwards, in profile. The slight prominence is produced by the scapulae and not by the vertebral column (v. fig. 226 and 228).



Fig. 228. — The same (see fig. 226 and 227) view of the back (in 1906,
8 years after redressment.

or medium gibbosities, the only ones you will have to treat in your practice (Fig. 237 to 240).

But should and could a **practitioner, not being a specialist,**

undertake the correction of a case of even slight gibbosity? **Yes,** on the same grounds that he could a correction of hip disease, or of white swelling of the knee; for a spine can be redressed as easily, if not more easily, than a hip or a knee, and without a *shadow of danger*. — Indeed, let us say it now, **every thing is reduced to the application of a large plaster** in the upright position (**supported and not suspended**; then there is no traumatism) and to the making afterwards an opening in the plaster through which one can make **direct pressure upon the projecting vertebræ**, cotton wool pressure, at once inoffensive and gentle, but at the same time energetic and efficacious.

Seeing that you are able to do it, you ought to correct, if only to prevent a greater evil — **for one is obliged to correct,**

at least a little, to make sure of arresting the development of the gibbosity already in existence.

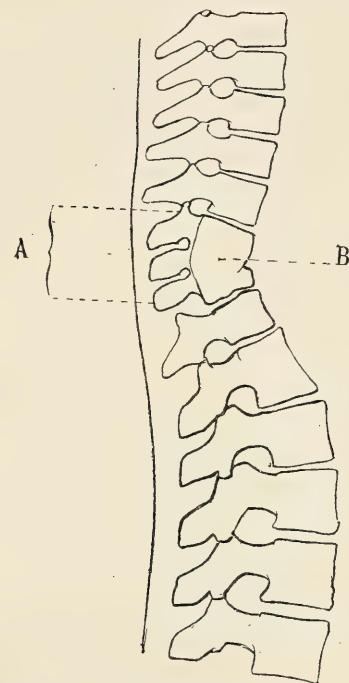


Fig. 229. — The patient in fig. 226 and 228. — Outline of radiogram by M. Infroit, where one sees; 1st, the vertebral column is continuous in front, B; 2nd, nevertheless the line of the back is straight; the gibbosity has disappeared, A.

B. — The treatment to be carried out in case 2 (the most frequent). We have just mentioned it: a plaster, with a dorsal ope-

ning, permits one to obtain not only retention, but also correction.

If **the necessity of a plaster corset** may perhaps, be debated in Pott's disease without gibbosity, **there is no discussion possible in the presence of a gibbosity already in existence.**

With all the other treatments, one does not effect im-

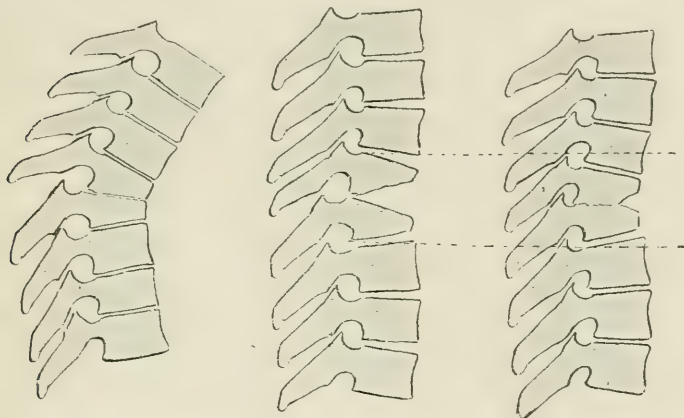


Fig. 230.

Fig. 231.

Fig. 232.

The mechanism of redressing a gibbosity in a case where at the anterior part the thickness of one vertebral body is lost. — From a radiograph.

Fig. 230. — Before redressment.

Fig. 231. — Here are the modifications which the redressment will produce. The two affected vertebræ separate in front, no longer touch one another except by the posterior parts of their bodies; their articular apophyses come near each other; all the intervertebral discs are enlarged in front. But if one effected the redressment progressively over several months, the separation, produced without traumatism or destruction, will be filled in little by little.

Fig. 232. — Four years later redressment is accomplished. The new static conditions obtained have the following effect; 1st., the compressed posterior parts of the vertebral bodies become atrophied and sink; the two articular apophyses become more and more imbricated; 2nd., all the vertebral bodies are pushed forward where they are submitted to less compression; this allows them to develop more at this point (in front) than in their posterior parts.

mediate pressure on the displaced vertebræ, and it is quite evident that the over-riding, already present, of two spinal segments may increase, and that it will increase little or much. Simple extension by the feet and the head will not escape from this reproach any more than the other methods; **extension** is too **irregular**, too **difficult** to carry out, and

particularly too **indirect** to have any real practical value. I said too indirect; indeed, when a gibbosity of the tenth dorsal vertebra exists, for example, supported by sclerosed or osteo-



Fig. 233. — May O., London. Gibbosity dating four years.

fibrous adhesions, an extension of several kilogrammes made to the feet or the head will have perhaps the effect of stretching the two extremities, but it will certainly not act in pulling into line the tenth dorsal vertebra, which will continue, on the contrary, to be displaced more and more, by an autonomous movement, due to local conditions against which this extension, too far away and too feeble, can do nothing.

On the contrary, with the large fenestrated plaster which allows of a precise and direct pressure on the displaced vertebrae, not only are they unable to fall back further, but, under the



Fig. 234. — The child in the preceding figure, five years after commencement of treatment.

influence of this continuous pushing from behind forwards they return gradually into line.

Reason says it and experience demonstrates it. It is enough

to look at the examples here given of corrections made by us in this way, to be convinced. (Fig. 227 to 240).

Conclusion. In the same way that a fracture suggests plaster immediately, **Pott's disease** should henceforth **suggest**



Fig. 235. — Lucien B ..., rue de Rivoli, Paris. Gibbosity dating eight years.

to you the **plaster corset**. It would even be easy to maintain that plaster is much more indispensable in the case of Pott's disease with gibbosity than in the case of ordinary traumatic fracture, where displacement, or even a tendency to displacement, does not always exist.

3rd CASE. — POTT'S DISEASE WITH ABSCESS.

Axiom. — Take care above everything not to open the abscess, nor to allow it to open; for, if it is opened,

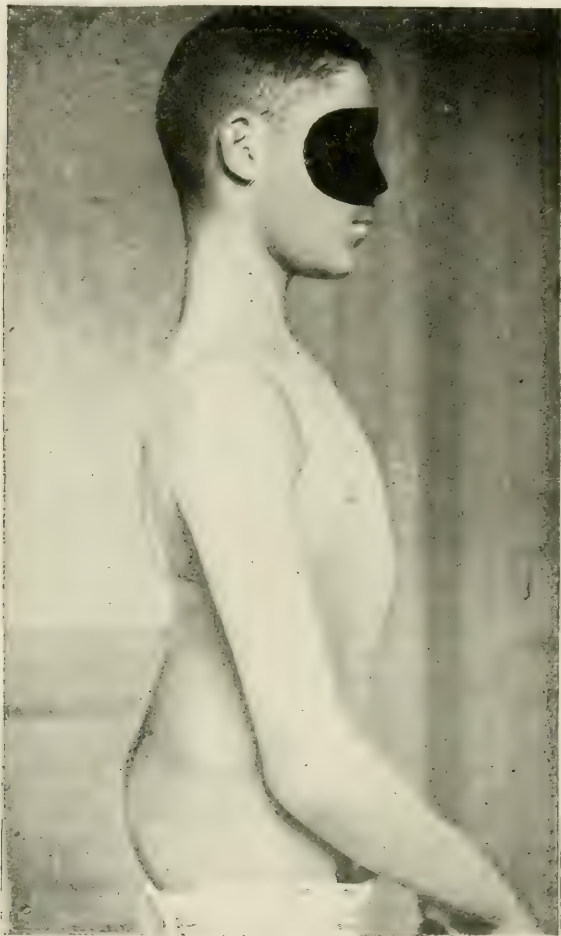


Fig. 236. — The same, six years after commencement of treatment.

it will scarcely ever heal; a fistula will remain which will become infected and sooner or later, end in death.

Here there is no discussion needed as to the treatment

which should be followed. Opinion is unanimous among well informed surgeons.

Even in the case of a **retro-pharyngeal abscess** in Pott's disease of the sub-occipital region, the abscess **must not be**



Fig. 237. — Martha G., Algiers. Gibbosity ten months before arriving at Berck.

opened, but if there should be grave and pressing functional troubles, **puncture** the collection by way of the neck, entering the skin at the side. (V. p. 344 for details of this technique).

The Formula for the Treatment of Abscesses

Here it is for the different varieties.

a) **Leave the abscess alone**, if it is not easily accessible, in which case the skin will not be in danger. This is *the most frequent case*.

b) **It is permissible, and even indicated, to treat it** if it is easily accessible, although the skin is not threatened.

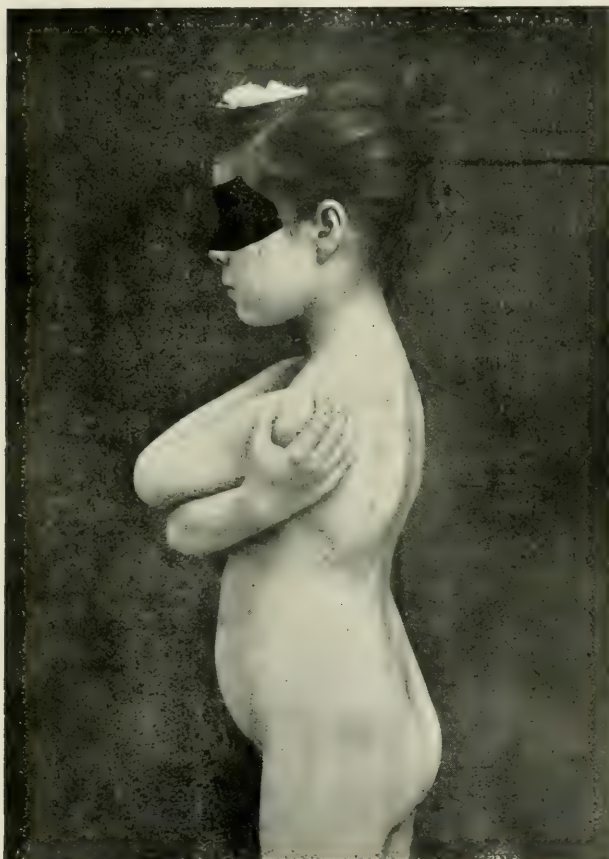


Fig. 238. — The child in the preceding figure, three and a half years after commencement of treatment.

c) **One ought immediately to treat it** when the skin is in danger, in which case it is easily accessible.

By treating it, I mean *puncture and injection* (v. Ch. III).

4th CASE. — POTT'S DISEASE WITH FISTULÆ.

We have explained (Chap. III) the general treatment of tuberculous fistulæ.

You recollect that :

a) *If the fistula is not infected* (that is there is neither fever nor albuminuria), one must inject into the sinus modifying



Fig. 239. — David Ter.-M., Tiflis, gibbosity of two year's standing.

injections (of creosote and iodoform, or of camphorated naphthol) either in the form of liquid or of paste.

b) *If the fistula is infected*, on the contrary, injections are bad; the treatment, in that case, is summed up in these few words : make certain of the *drainage*, *rigorous asepsis*, *rest*, *general treatment*, and *patience*.

5TH CASE. — POTT'S DISEASE WITH PARALYSIS.

a) **The indication** is to release the cord from pressure and to modify, if possible, its circulation and its internal nutrition. See figure 202, page 241.

How are we to do this?



Fig. 240. — The same, three years after redressment.

With or without operation?

b) **The treatment to be carried out** : one fulfils the indications by gently redressing the spine and by exerting afterwards a gentle and continuous pressure over the affected vertebræ, by the only **orthopedic treatment**; that is, by the application of a large plaster only, with a dorsal opening. Whilst surgical operations are nearly always useless, and even very often,

harmful, they ought to be condemned without appeal in the treatment of paralysis, just as in that of abscess by gravitation.

Indeed, operations do 20 times more harm than good, not



Fig. 240 bis. — Germaine B., aged 7 years, of Santiago, Chili. — Gibbosity of two and a half years standing. — (This little girl was so restless and intractable that we were obliged to have recourse to chloroform in order to apply the first apparatus. The child was put to sleep and supported in the sitting position; see page 351 « on chloroformisation in applying the plaster ». The child having been « made comfortable » by wearing the first apparatus, it was possible to apply the others without the help of chloroform). — see fig. 240 ter, the same child after treatment.

only because they show a considerable immediate mortality (nearly 40 per cent), but because they leave a fistula, that is, a **complication much more formidable**, without contradiction,

than the paralysis, which one wishes to cure. For, paralysis, remember, may be cured spontaneously, but especially it may be cured by orthopedic treatment alone, always or nearly always.



Fig. 240 ter. — The same 3 1/2 years after straightening.

Why not always? Because sometimes it is a question of tuberculous myelitis against which our treatment is less precise and less certain.

Very often one observes a distinct improvement a few hours

after the application of the apparatus. The two legs may perhaps have been absolutely motionless for more than six months, and behold, on the first evening, they move a little. Two or three days later, the heels are freely raised above the level of the bed. This return of functional activity in the paralysed part occurs almost regularly. Each week brings about a new improvement : in from 3 to 9 months, the paralysis has disappeared, not only from the lower limbs, but also from the bladder and intestine.

2nd PART. — THE TECHNIQUE

On the whole, the treatment may be reduced to two things : —

A. — The plaster corset.

B. — Puncture and injection, when there is abscess.

I have laid down in the first part of this chapter what is desirable to be done : I am going to describe in the second part how it ought to be done.

A. — TECHNIQUE OF THE PLASTER APPARATUS

How to make a good plaster corset, when no specialist is available, which realises all the required conditions, that is, one which supports well and nevertheless does not incommode the patient.

A plaster corset is not more difficult to make than a plaster for the leg, which nearly all practitioners can make easily. The only difference between the two is that you have learned to make the latter, but not the plaster corset.

Well, I have undertaken to teach you, and I promise you will succeed in doing it, if you follow faithfully the technical indications I give you here.

Make one or two preliminary rehearsals. — What I ask of you is, as to the first corset you have to apply, to make for yourself (one or two days before) one or two general rehearsals on a « mannequin », or on some healthy subject of

the same age approximately as the patient. This will enable you to test the quality of your plaster, to train yourself, to educate your assistant, who may be simply your own domestic, if you cannot secure the aid of a trained nurse.

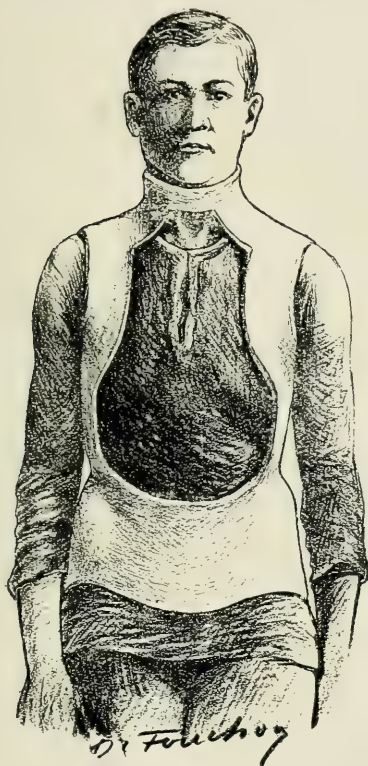


Fig. 241. — The medium plaster.

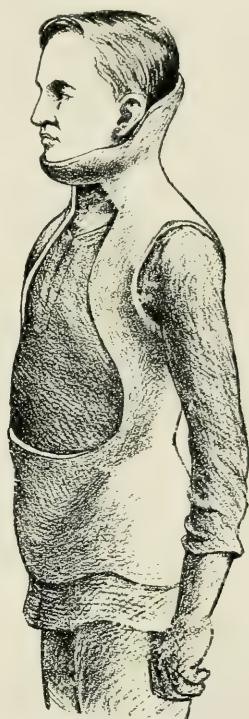


Fig. 242. — The large plaster.

This rehearsal is always possible in practice, for if, for a fracture, the plaster must be applied immediately, you may, in Pott's disease, put off for one or two days the application of the corset. In the meantime, the patient should be kept at rest in the recumbent position.

Choice of Model of Plaster Corset.

There are three models : *the large plaster*, having the upper

part in the form of a funnel or a tray enclosing the base of the skull (fig. 242); *the medium plaster, with an officer's collar* (fig. 241); and *the small plaster without a collar*.

They differ only in their upper parts, all of them stop below from 2 to 3 cm. above the great trochanter.

The choice of apparatus depends on the situation of the affection.

For **Pott's disease below the 6th dorsal vertebra**, and for **lumbar Pott's disease**, we use a **medium apparatus** with a straight collar.

For **Pott's disease of the cervical or upper dorsal regions**, above the sixth dorsal vertebra, and for all **Pott's diseases with paralysis**, without distinction of situation, it is necessary to apply the **large apparatus** with the funnel-shaped upper part.

The **small apparatus without a collar** ought to be reserved as an **apparatus for convalescence**, for Pott's disease of the lower dorsal or lumbar regions.

1. — *The medium apparatus.*

We will describe first the construction of the medium plaster, which is of the three, that most used; we will point out as we proceed various peculiarities proper to the other two.

Position of the patient. — « **Stretch, but do not suspend.** »

The [apparatus should] be made with the subject in the upright position; one *supports* him only, without really suspending him.

Make, in a word, extension only, in such a way that the heels do not leave the ground (fig. 243, 244). This tension is, first, absolutely harmless, as you may guess, even in enfeebled subjects; second, it is very well tolerated by everybody, for the 10 or 12 minutes necessary for the construction of the apparatus, including the setting of the plaster.

If you adhere to this formula, you have gained everything

and lost nothing in **making the apparatus in the upright position** rather than in the horizontal position¹.

The subject will thus be better adjusted without being



Fig. 243. — *Stretch and do not suspend.*

In figure 243, the cord has not been tightened. One sees in fig. 244, that in pulling on the head, one has rectified the attitude and even corrected (slightly) the gibbosity *without the feet of the patient quitting the ground.*



Fig. 244.

fatigued, and you will have infinitely more facility for constructing your plaster regularly and precisely.

(a) **The supporting apparatus.** — The appliance for supporting the patient should be, in default of a pulley, a simple cord fixed to a hook in the ceiling or in a doorway. The cord

1. For *paralysed* subjects, you would construct the apparatus *in the sitting posture*, which gives sufficient traction (to free the spinal cord) and not too much (to prevent sudden injury to the tuberculous focus, and later on, an abrasion of the chin) (fig. 245 and 246).

has at its extremity the centre of a horizontal bar of wood or



Fig. 245. — Pelvi-support made up of a bicycle saddle on which is seated the paralysed patient, during the construction of the apparatus.

Fig. 246. — His thighs are a little flexed in order to free the ischia and render the support more stable, but not too much flexed to hinder the exact application of the plaster in front. One steadies the patient by pressing on the knees.

metal, furnished at each end with a groove to retain the two terminal buckles of the occipito-mental straps.

But, without pulley and without hook, you may anywhere improvise a suspensory apparatus, by means of a step ladder

(fig. 247) over the top of which you pass the cord sustaining the horizontal bar at a distance from the ground calculated from the height of the patient.

It is easy, with or without a pulley, to **regulate the height**



Fig. 247. — Sustention apparatus improvised with a step ladder.

of the horizontal bar, either by lengthening or shortening the cord, or by approximating or separating the feet of the ladder.

(b) **The occipito-mental strap.** — The patient is bound to the supporting apparatus by a strap or collar-piece (fig. 247).

With an ordinary linen bandage and two safety pins, one makes on the spot a girth which can with advantage take the

place of all the Sayre's collars, or of those sold by the instrument makers.

The figures following show the method of procedure. You



Fig. 248. — To make a girth, take a bandage of ordinary linen 20 cm. longer than the height of the patient; fold it in two and knot the two extremities together.

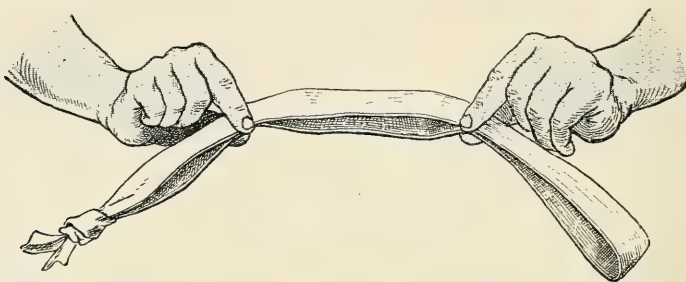


Fig. 249. — Divide this large loop into three by taking the bandage between the thumb and index finger of each hand at the 2 extremities of its middle third.

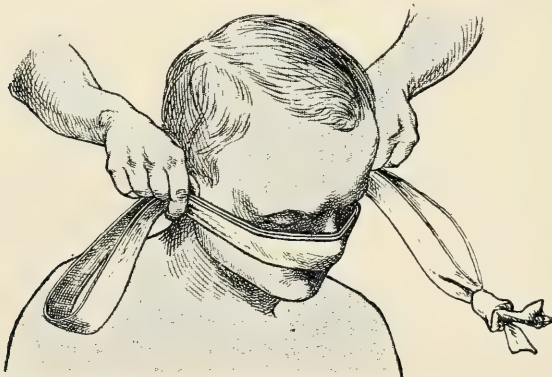


Fig. 250. — The median portion of the loop should be of such a length, that when applied (the two layers superimposed) on the face of the patient on a level with the nose, the points held by the fingers and thumbs correspond with the auditory meatus.

take a bandage of a length equal to the height of the patient measured from the head to the feet (or better still, 20 cm. longer), you fold this bandage into two, and knot the two free

extremities together. You have thus a large loop (fig. 248). You then divide this single loop into three secondary loops, one median, to embrace the base of the head (fig. 249 and fig. 250) and two lateral ones (which are folded upwards as soon as the girth is in position), to hang on the two extremities of the transverse bar of the sustentation apparatus.



Fig. 251. — The fingers are replaced by two safety pins.

The median loop ought to have a circumference equal to twice the distance which separates (in front) the two auditory meatus of the patient.

You measure the distance between one ear and the other simply with the middle portion of the bandage held thus : (fig. 249

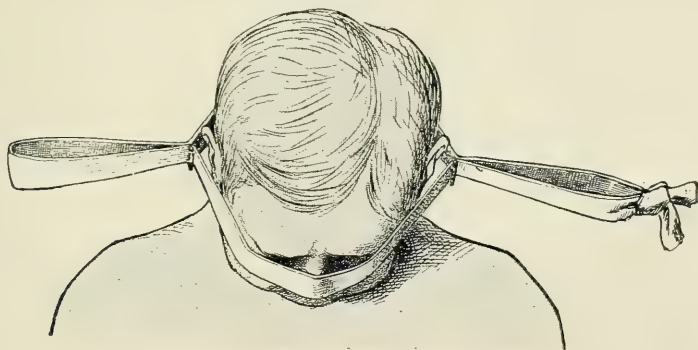


Fig. 252. — Placing the girth in position. — The head engaged in the middle loop ought to pass easily, but not too much so : only one centimetre of play must be allowed on each side (if it is more or less, it drags on the pins and may pull them out).

and 250) with two fingers on each side. The measure taken, you put two pins transversely in place of your fingers (fig. 251).

So much for the dimensions of the median loop, which is most important. On the other hand, the lateral loops are not of much importance : it is sufficient to have them equal, for their inequality may produce an inclination of the head to one

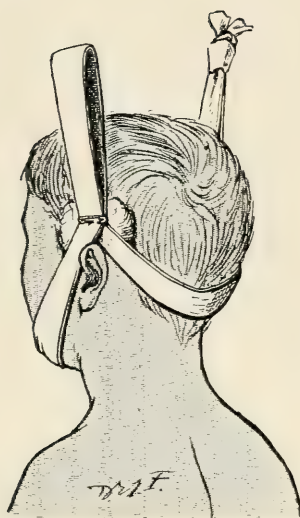


Fig. 253. — The two layers of the middle loop enclose the chin and the occiput. When the lateral loops are released the pin should be a centimetre above the upper border of the ear.

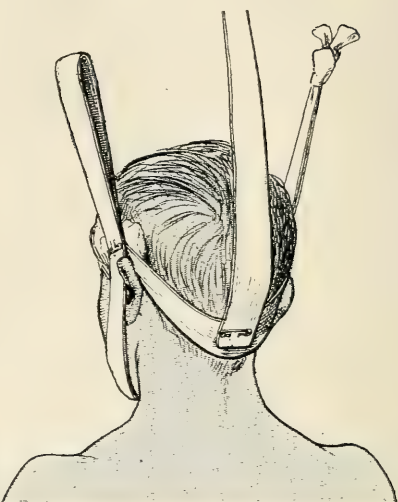


Fig. 254. — You fix with a pin one end of the strip to the centre of the posterior handle of the middle loop.

(One sees in these figures small squares of cotton wool with which you protect the skin against friction by the pins.)

side or the other, which must be avoided. To *adjust* a girth you open horizontally the middle loop, introducing it from above downwards (fig. 252) to the root of the neck. You adapt the anterior layer to the chin and the posterior layer to the occiput, after which you release the lateral loops in order to pass them on to the extremities of the horizontal bar (fastening them to the grooves if there are any). This being done, the middle loop will describe a broken circumference, which will prevent its slipping when the patient is pulled upwards, and it will slip all the less as he is pulled upwards (provided that you have given it the measurements indi-

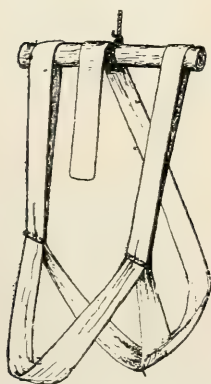


Fig. 255. — The girth finished and adapted; a seam has been made instead of a knot.

eated above). But if the patient pulls on the girth, you see that the chin is on the same level as the occiput (fig. 256), that is to say that the head *tilts backwards*.

Normally, the chin should correspond with the level of the



Fig. 256.



Fig. 257.

Comparison of the two figures shews the utility of the posterior strip.

Fig. 256. — The strip is missing : the two layers, anterior and posterior, being equal, the head is pulled backwards. — Fig. 257. — The posterior strip prevents the pulling backwards.

lower part of the 3rd cervical vertebra. In order to bring it back to this level (the normal) we take a supplementary strip of linen (one metre in length) of which one extremity is pinned transversely over the middle of the posterior layer of the girth (fig. 254), whilst the other free extremity will be pulled upwards and, as soon as we pull upwards, it will tilt the head forwards. We pull until the chin returns to the normal level (fig. 257). As soon as this is done, you fix at this degree of tension the free extremity of the strip by rolling it and tying it round the centre of the horizontal bar (fig. 257).

I would advise you, so as not to fatigue the patient, to adapt and test the girth while he is still at rest on the table;



Fig. 258. — Method of cutting the attelles out of a piece of muslin.

— you may even leave him there until the different parts of the corset are ready.

Preparation of the parts of the Corset.

The apparatus is made with strips and plastered attelles applied over a jersey (v. on *Generalities*, chap. I).

Procure : 1st. From **5 to 10 kilos** (so as to have “too much”) **white plaster of Paris**.

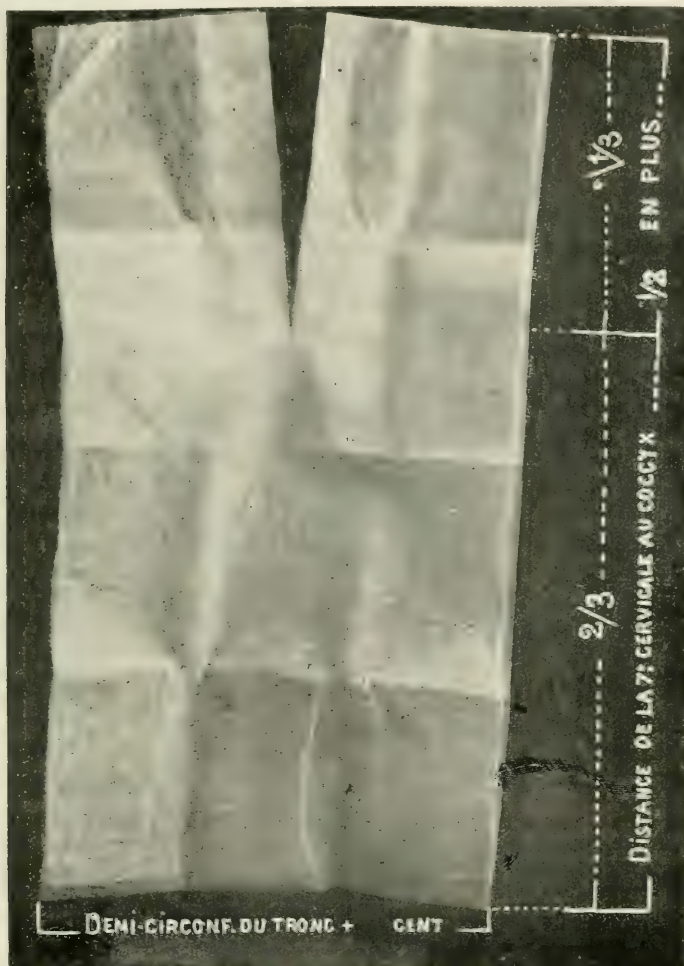


Fig. 259. — Posterior attelle torn in the middle to a third of its length (width equal to one half the circumference of the trunk + 2 to 3 cm)

2nd Some common **stiff gummed muslin No 8**; have too much of that also, and for that take from 10 to 20 metres according to the age of the patient.

From this muslin, cut the *strips* and the *attelles*.

a) Make some **strips** **5 m.** long, from 12 to 15 cm. wide.
Number of strips : — 2 for a child from 3 to 5 years, three

for a child of from 6 to 11 years; four for a child of 12 or 14 years; five or six for an *adult*.

b) Cut also **3 attelles** (fig. 258) : two large ones for strengthening the back and front, and a small one for the collar.

Their *thickness* is three sheets of muslin for each (fig. 258). The *length and width* are the same for the two big ones : length 1 1/2 times that of the trunk;— width, 1/2 the circumference of the trunk, plus 2 or 3 cm. (fig. 259).

The length of the small attelle is equal to one turn round the neck, plus 3 or 4 cm. and its breadth equal to the length of the neck (fig. 261). One of the two large attelles is rent to a third of its length in two equal tails. Finally, the edges of the one and of the other are slightly incised at several points by a few cuts of the scissors, to facilitate their application around the trunk, and to prevent creases (fig. 267).

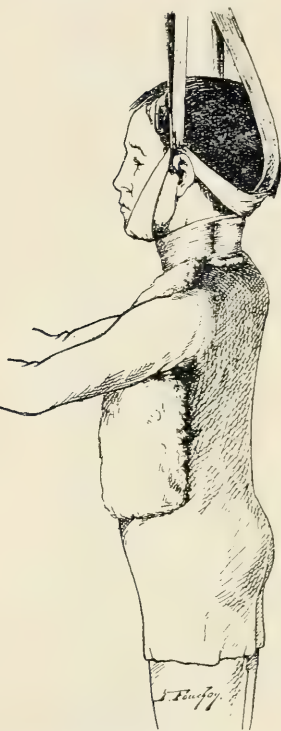


Fig. 260. — Jersey, woollen neck-piece, and cotton-wool square applied over the thorax.

The strips and squares of muslin being cut to size, we pass on to the *preparation of the patient*.

Preparation of the Patient.

The patient, **still laid down**, is invested with the jersey. Do not apply cotton wool¹ because it is difficult to spread

1. Or, if you must use cotton wool, see that it lies uniformly and in as thin layer as possible, 2 mm. at most.

evenly. Rather use a jersey (fig. 260), or, better, two jerseys, one over the other and fitting well. If there remain any folds obliterate them by "pinching" in front.

The two edges (anterior and posterior) are joined together at the bottom, between the legs, by means of two safety-pins. To complete the upper part of the jersey, prepare a neck-piece in soft cloth, circular and fitting well, which should be closed behind¹. (Fig. 261.)

Prepare also, for putting on the breast, over the jersey, a

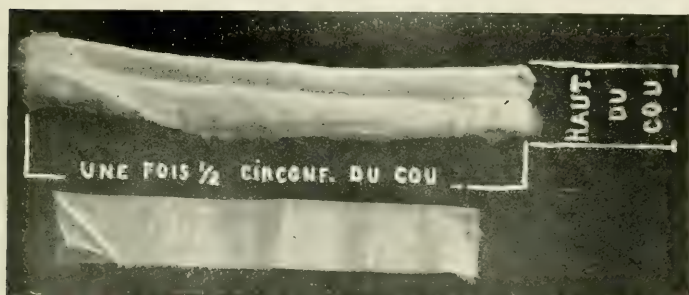


Fig. 261. Neck-piece composed of a strip of cotton between two folds of soft muslin. Underneath, one sees the attelle for the neck.

square of cotton wool of 1 or 2 cm. in thickness, and the length and breadth of the thorax. This wool is intended to facilitate, by its elasticity, the expansion of the thoracic cage (fig. 260), and it will be possible to remove it afterwards, when the anterior opening in the apparatus has been made. (v. p. 300 and 301.)

The cotton-wool square and the neck piece thus prepared will not be put in place until the patient is on his feet, in good position.

The patient dressed in the jersey, is afterwards furnished

1. Failing a cloth neck-piece, you may use a circular cravat, made with a strip of cotton-wool of a length and breadth equal to the height and circumference (or better, one circumference and a half) of the neck, and $1\frac{1}{2}$ cm. in thickness, which one places between two folds of soft muslin of the same dimensions. This cravat is passed round the neck, the centre in front and the two extremities held over the nucha by an assistant, or by a stitch or a safety pin, until it has been fixed by the first turn of plaster bandage.

with a girth, the centre of the anterior layer of which corresponds with the point of the chin, and the posterior layer with the occiput, whilst one gently raises the two lateral loops

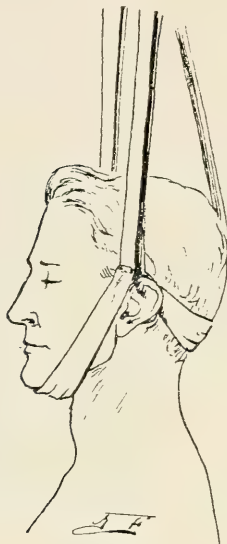


Fig. 262.

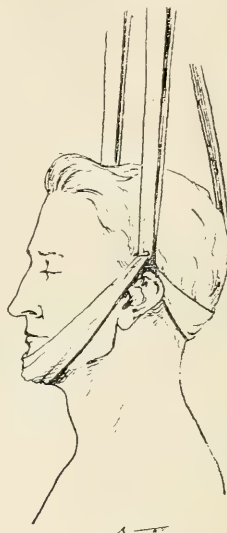


Fig. 263.

To the left of the reader, the bad application of the chin piece which, placed too far back, slips back and strangles. To the right, the good application of the piece; it embraces the chin after the fashion of a sling, the point of the chin corresponding with the centre of the breadth of strip.

(fig. 262 and 263). One protects the ears from the lateral pins by two small pieces of cotton wool.

Position of the Patient.

The patient is placed upright, beneath the sustentation apparatus; the two loops of the girth are placed in the grooves of the horizontal bar, at about 10 cm. from the centre, at any rate at an equal distance from the centre, so that there is no inclination of the head to one side. To lower the chin to the desired level, you then pull on the second strip, and fix it

it in this position by tying the strip round the middle of the bar. (v. fig. 256.)

One verifies the height of the middle cord, rectifying it with care, shortening it or lengthening it, until the patient is "extended" to the required degree, that is, **just up to the point where the heels leave the ground, and no more.**

You satisfy yourself that the patient is at his ease, and even, if I may say so, quite comfortable. His hands are held by some member of his family, the arms removed from the trunk at an angle of 45°; this is only a fictitious support, a "moral" support. Another person keeps in position, **for a moment**, the pre-thoracic square and the woollen cravat — until the first turn of the bandage fixes them in their place.

Immediately afterwards you pass on to the construction of the plaster.

Construction of the Apparatus.

Ist. Preparation of the plaster cream.

It has already been said in the "*Generalities*" (v. p. 20) that for plaster corsets it is **much better** to use **plaster strips, prepared** a little (very little) **beforehand**, rather than bandages steeped at the time in the plaster cream.

In the second place, for a corset, the **cream**, which serves as "mortar" and for plastering the attelles, **ought to be thinner than that for small plasters** of the leg and arm (one takes **4 cups of water, instead of 3**, to 5 cups of plaster).

This thinner cream will set in about fifteen minutes (not as before, in ten). As you require a few minutes to verify the posture and to model the apparatus before the plaster sets, you have then from 10 to 12 minutes to construct the plaster; 10 to 12 minutes are sufficient, and are necessary, when you are not in "training". Moreover you will have ascertained all this in the rehearsal you have made. If you have noticed that it took you from 15 to 18 minutes to build a "trial" apparatus, you may add, for the real plaster, half a cup full of water to

the quantity mentioned above, which retards the setting by 4 or 5 minutes more — and, on the other hand, if you have only taken 5 or 6 minutes over the trial plaster (personally we



Fig. 264 — Application of the first strip. Begin at the angle of the left scapula (1); then the strip is led over the right shoulder, passing diagonally over the thorax, crossing the left axilla (2), finally it is conducted horizontally behind, from the left axilla to the right (3).

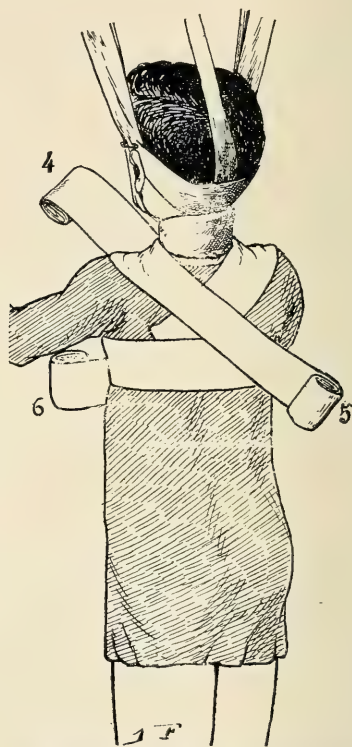


Fig. 265. — The first bandage then passes diagonally over the anterior aspect of the thorax, from the right axilla to the left shoulder (4); it is afterwards conducted diagonally behind, from the left shoulder to the right axilla (5); finally it passes in front, going horizontally from the right axilla to the left axilla.

take 2 or 3 minutes for constructing a corset), or, if the setting of your plaster is not complete under 20 minutes, for example,

you add for the real apparatus, half a cup full of plaster, which advances the setting by about 5 minutes.

The **plastering of the attelles** is done in the ordinary way (see p. 25 and fig. 9) by dipping them in a basin half full



Fig. 266. — Placing in position the posterior attelle.

of cream. Your assistant should do this plastering, while you apply the first strip (or you do it yourself before the application, if you have not an expert assistant). The three attelles are left in the basin, awaiting the moment for their application.

2nd. The method of application of the strips.

Remember the 3 fundamental recommendations : it is necessary to **spread out the strip, to apply it exactly, but without pressure.**



Fig. 267. — After the application of the attelle, some incisions are made in its edges to facilitate its adaptation. The right tail is already flattened down on the shoulder, the left tail is still raised. — The two tails must go round the shoulders in front and unite below the axilla at the lateral borders of the attelle (*v. fig. 269*).

What should be the course taken by the strips? Not complicated in any way (fig. 264 and 265). You cover the region of the shoulders by some diagonal turns and figures of 8 over the region of the shoulders, always avoiding ridges being made, incising the edges, if need be, when they are too tight.

Afterwards you go by circular turns from the axilla downwards, as far as needed, **without reverses** (*v. p. 30 and 31*). With a few cuts with the scissors at the edges, these circular bandages, moist and delicate, are easily applied, even over a trunk which is not regular in form.

Each turn of the strip ought to cover nearly $\frac{1}{4}$ of the preceding turn.

In this way is made the first **continuous covering** of the trunk. One bandage will suffice

for a little child ; it may take two or three for adolescents and adults.

3rd. Application of the Attelles.

One then applies the attelles, having taken care to spread them out, after having squeezed them.

a) One commences with the posterior one or "chasuble".

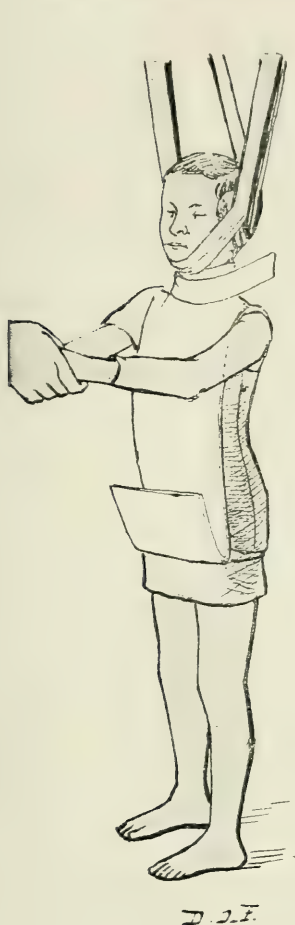


Fig. 268. — Placing in position the circular attelle of the shoulder and the anterior attelle, of which the inferior third is raised up; that which is represented here is too narrow, it ought to overlap the axillary line by one or two centimetres.



Fig. 269. — The attelles in place : one sees the extremity of the superior tail of the "chasuble" under the axilla, and the inferior third of the anterior attelle raised up over the abdomen : also the attelle for the neck over the woollen neck-piece.

The inferior edge is placed at the level of the tip of the coccyx.

so that the back is covered by two thirds of the attelle. The upper third, which passes upwards over the scapulæ, has been split into two tails of equal width, to go over the shoulders (fig. 266); each tail passes over, then in front of the correspond-



Fig. 270. — Modelling the apparatus above the iliac crests.

ing shoulder, afterwards under the axilla, and returns to unite with the corresponding lateral border of the posterior part of the attelle. Some incisions, made here and there, into the edges of each tail (fig. 267) facilitate it's application and it's exact adaptation to the circumference of the shoulder.

b) One takes **afterwards the anterior attelle** and applies it first by it's superior border a finger's breadth above the

clavicles; it covers the tails of the preceding attelle, then descends over the chest and abdomen. The inferior $\frac{1}{3}$ hangs below the pubes; one folds this apron over the middle $\frac{1}{3}$, even with the abdomen; the fold corresponds with the line of the trochanters; this will be the lower border of the plaster (fig. 268, 269).

c) **The attelle for the neck** is applied like a **circular cravat** (fig. 268) over the woollen covering. The upper edge of this piece stops at one centimetre below the upper edge of the woollen cravat (fig. 269), and the lower edge encroaches upon the upper parts of the two preceding attelles. It is sufficient to roll it without any pressure (nevertheless exactly), to avoid with certainty all constriction of the neck. In a word you apply it as you do your collar; were it made of sheet-iron and placed directly on the skin, it would not, however, compress your larynx.

The three attelles being placed in position, which is very rapidly done (a minute for each if one is assisted by one or two persons), **you join them** by rolling over them a plastered strip in the way mentioned for the under one, that is, in figures-of-8 and circular turns.

One strip over the attelles and one below (two in all) suffice to construct the apparatus for children of less than six years, but 4 or 5 strips (in all) are necessary, as we have said, for subjects of from twelve to fifteen years.

You may have to use 6 or even 7 strips (without counting the attelles) for adolescents and adults rather big and fat, to give thickness and the required resistance to the plaster.

Between the different layers of the strips and **over the last**, one spreads, as has been mentioned in the generalities, **a layer one or two millimetres** thick of plaster cream. — It is the mortar which unites into one solid block the different planes of the apparatus.

4th. Modelling the plaster.

The apparatus is finished. Nothing remains but to model it over the pelvis and around the shoulders (fig. 270 to 272).



Fig. 271. — Modelling the shoulders and iliac crests, in a large plaster: the modelling is done in the same way as in a medium plaster. — Another assistant models at the same time the sacrum and pubes (that assistant has not been shewn here in order to leave the figure more distinct, but see the figure on the following page).

1st. Over the pelvis: you model by embracing with both hands, half-closed, the spines and iliac crests, pressing the plaster very firmly **above the superior border and inwards along the anterior border** of the hip-bone with the pulp of the fingers (fig. 270) whilst the palms of the hands press below the iliac crests. **The spines and the crests are thus capped, encased** by the apparatus, without any risk of sloughing (fig. 271).

2nd. Over the contour of the shoulders, where an assistant¹ applies the plaster with very light pressure (fig. 271).

One occupies, in effecting the modelling, the few minutes which precede the setting of the plaster, according to the calculation laid down before. It is then, at about the fifteenth minute, the plaster being set, that the patient

can be removed from the sustention apparatus. To do this,

1. A second assistant makes it fit exactly over the pubes and the sacrum (v. fig. 272).

open out the feet of the step-ladder, or loosen the cord; then pull forward, to disengage the chin piece of the girth.

Let the child stand upright for ten minutes more, so as not to risk by lying him down too soon, the cracking of the apparatus; — then the plaster appearing to be solid, the patient is



Fig. 272. — Modelling the sacrum and pubes in a large or medium apparatus. The iliac crests are modelled at the same time. (v. preceding figure and its explanation).

laid down — placing transversely under his neck a small roll of cotton wool in the form of a log, or, more simply, leaving his head to overhang the end of the table, supporting it with the hand.

5th. Trimming the apparatus.

A quarter of an hour or half an hour afterwards (with the patient lying down) you proceed to trim the apparatus (fig. 273),

which is done with a bistoury or a *common knife* well sharpened.

The plaster is cut (down to the jersey only) :

At the bottom, below the iliac spines, cut little by little, just enough to allow the patient to bend the thigh to a right angle, if it is desired that he should walk about with the apparatus. Cut out less if he ought to remain incumbent; for the legs will be thus somewhat restrained, and immobilization will be perfect.

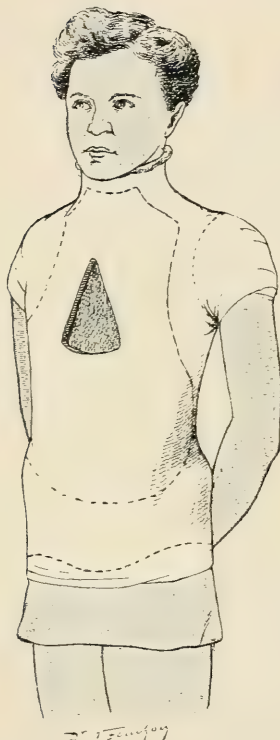


Fig. 273. — Apparatus with officer's collar and a provisional opening; the dotted lines shew the limits of the large definite opening and the edge of the apparatus after trimming.

The plaster is allowed to extend downwards in the shape of a point over the pubes and also behind over the sacrum.

At each side of the shoulders cut away all that goes beyond the scapulo-humeral articulation.

The **arm holes** are freed for 2 c. m. so as to allow of ease in the movements of the arms.

The **superior border of the collar** is pared for a few millimetres to make it even.

A small provisional opening is made afterwards over the front of the chest through which can be drawn the cotton wool placed in front of the jersey. This facilitates the movements of the thorax, without damaging the solidity or the precision of the apparatus.

Strengthening the plaster.

Suppose that the plaster is too weak, all over, or at some one point.

It may happen in spite of all the precautions taken in laying the patient down, that the plaster has cracked during the manoeuvre ; it may even crack or become crumpled spontaneously.



Fig. 274. — The medium apparatus trimmed. Permanent anterior opening.

Here is the way you remedy this : You pull on the top and the bottom of the apparatus in order to return the patient (lying down or upright) to the position desired, and whilst two

assistants maintain this position, it is fixed there, by the application of several squares of plastered muslin over the weak places, flattening them out with several turns of bandage. Hold it so until the setting of the new plastered pieces.

To succeed in making these repairs, it is well to commence by spreading over the part you wish to strengthen a layer of **rather liquid** paste (equal parts of water and plaster) and it is over this layer of paste that you will apply the squares of



Fig. 275. — Dorsal opening for the compression of the affected vertebræ (in a large apparatus).

plastered muslin, of a single thickness and one by one. This precaution is absolutely indispensable when it is desired to repair a plaster already dry. (For the details, refer to the generalities of the technique of plaster apparatus, chap. I.)

Polishing the apparatus.

Two days after it has been constructed, one polishes the plaster, which is done after the method mentioned in the generalities, pages 79, 80 and 81.

The openings in the plaster.

24 or 48 hours after the polishing, you make the *permanent openings*.

In cutting the openings in the plaster, as in trimming, cut layer after layer, very gently, until you have the sensation of no longer touching hard plaster, but the tissue of the jersey.

Be careful not to cut inadvertently through the jersey.

With a little practice you will easily succeed. But the safest way is to place over the jersey, **at the points where** you intend making the **openings** (over the gibbosity or at any other point), a **square of cotton wool** 1·2 cm. in thickness, before constructing the plaster. Thanks to this square, you



Fig. 276. — Dorsal opening in a medium plaster.

will be able to make an opening without fear of wounding the child. The **double jersey** also gives a greater security.

1st. Permanent anterior opening (fig. 274.)

It's dimensions. — Each lateral part of the plaster has a width equal to about a quarter the width of the breast, at the level of the shoulders. But the opening widens very much at the lower part, extending from one vertical axillary line to the other. The top piece is 3 or 4 cm. high and the bottom one 8 or 10 cm.

2nd. Dorsal opening.

This is made at the same time as the preceding one.

In the case of a gibbosity unusually pointed, one does not wait for 2 or 3 days. Ten or fifteen hours after the plaster

is made, the dorsal opening is cut out, so as to be perfectly certain that all abrasion of the skin is avoided. (fig. 275).

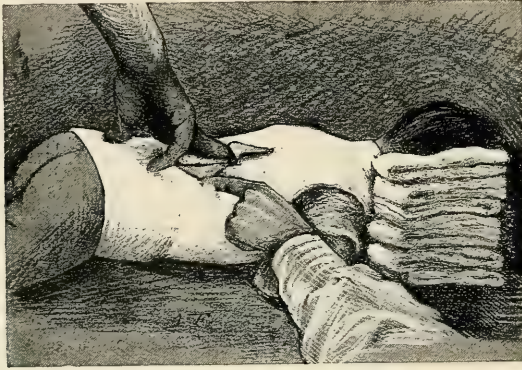


Fig. 277. — The flaps of the jersey are held by an assistant: you place in position the square of cotton wool, which you carefully spread out at the sides between the skin and the jersey by means of your fingers, or some flat instrument (a spatula).

The dorsal opening is indispensable in all apparatus for Pott's disease. I say indispensable. If you remove a piece

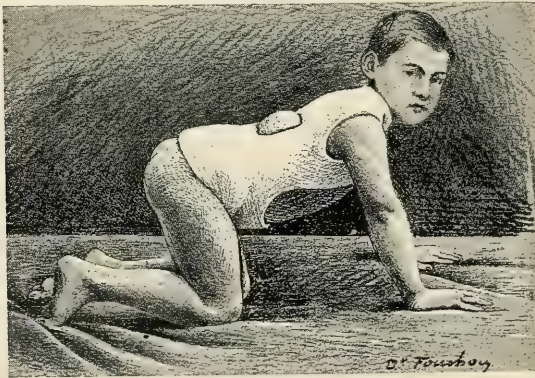


Fig. 278. — The dome of wool projecting through the dorsal opening.

from the dorsal aspect of any corset or apparatus, even if this corset has been applied during complete suspension of the

patient, and expose the bare skin, you will see (fig. 276) that the vertebræ do not touch the inner surface of the corset;

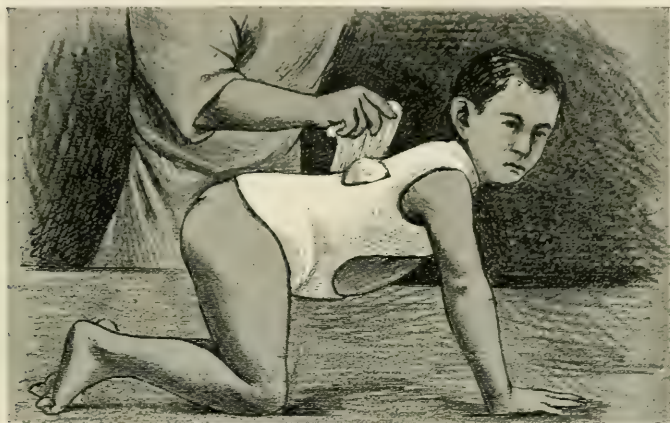


Fig. 279. — Compression of the dome by means of a band of strapping.

there may even be a gap of from 4 to 5 cm. — which proves that they are not sufficiently supported. This simple examina-

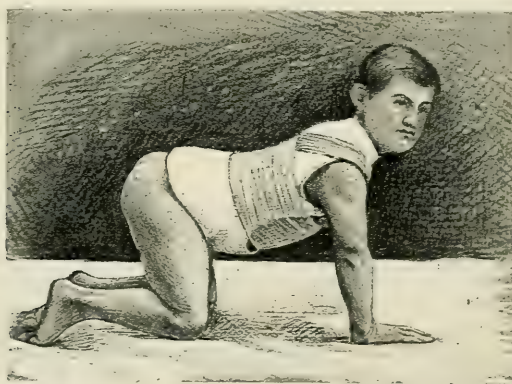


Fig. 280. — The compression is completed.

tion explains too well how, **in the ordinary corsets without a dorsal opening, the gibbosities may not only persist, but become aggravated.**

If you wish the affected vertebræ to be supported constantly, you see that it is necessary to place there, in very great number,

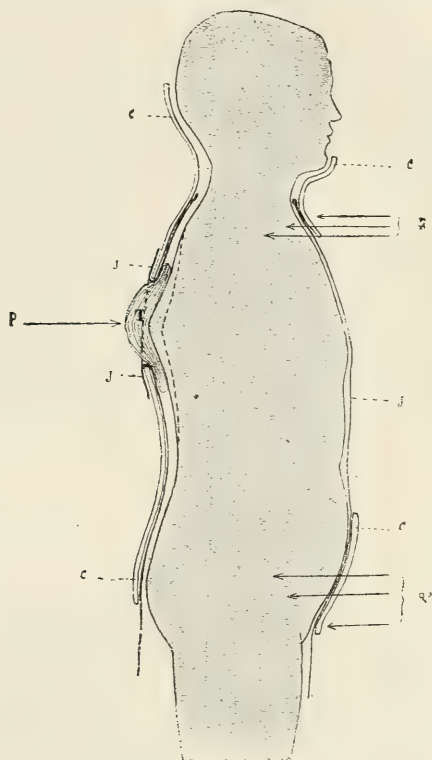


Fig. 281. — Schematic sketch of a large apparatus furnished with a compressive tampon, before the application of the strapping : C. section of the plaster, interrupted in front by a large anterior opening (which reaches up to the hyoid bone, v. fig. 241); J. Jersey turned aside at the edges of the dorsal opening; T. squares of wool forming a tampon over the gibbosity; — P. direction of the pressure of the strapping which acts by pushing back the wool tampon and the gibbosity to the position indicated by the dotted lines; — R. Points of counter pressure of the apparatus on a level with the scapular girdle: — R' Points of counter-pressure of the apparatus at the level of the pelvic girdle.

squares of elastic wool, in order to exert a continuous pressure upon the corresponding vertebral segments.

Dimensions of the dorsal opening. — It ought to extend from 3 or 4 cm. on each side of the affected vertebral segment (fig. 275).

The plastered piece is removed, as if it were punched out, with a bistoury; then you divide diagonally the small square of exposed jersey, raise up the flaps, and proceed to the compression.

Technique of the compression.

You commence by anointing the skin with a layer of **vaseline** of one or two millimetres in thickness.

Cut, next, **squares of wool a little larger than the opening** (fig. 276),



Fig. 282. — The gummed bandage applied and partly obscuring the large anterior opening.

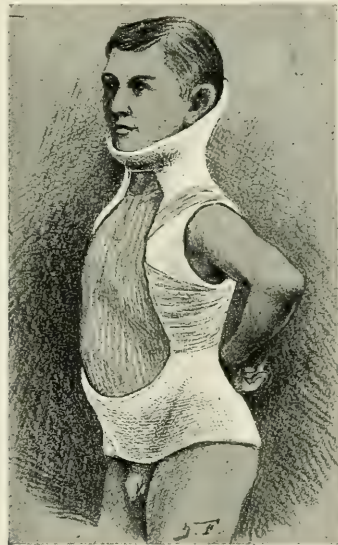


Fig. 283. — The anterior opening has been freed of the turns of bandage obscuring the opening partly.

and of 1 cm. in thickness. Cut and introduce them at once between the affected vertebræ and the internal wall of the pillars of the opening (fig. 277).

Use thus 8 to 10 squares of wool for the first compression.

The wool makes a projecting dome through the opening

(fig. 278). The projecting wool is forced into the opening until level with the plaster, with one or two strips of sticking plaster, moistened, rolled round the apparatus, and exercising a strong compression over the woollen dome (fig. 279). The dome diminishes by degrees until it is entirely effaced (fig. 280 and 281).

The sticking-plaster adheres very soon firmly all round the plaster, and a few hours later, you may cut out and remove the part of the strip which covers the anterior opening : which restores to respiration it's complete liberty (fig. 282 and 283).

The **number of cotton-wool squares** varies according to the case.

a. There is no gibbosity;

You use 8 to 10 squares (to prevent the appearance of a gibbosity).

b. There is a gibbosity;

You can then go up to 15 or 18 squares of 1 cm. not at once, but at the third or fourth compression, when the space which is found between the vertebræ and the plaster has become more pronounced.

18 squares seems enormous, but they adapt themselves in an incredible way, and we have never seen any inconvenience from a compression carried to this extent in a gradual way.

The gibbosity is by this means, progressively pushed forwards, whilst the vertebræ above and below tend, on the other hand, to return towards the posterior wall of the apparatus, because of the immobilisation of the shoulders and the pelvis (fig. 281). The condition is comparable to that of a child leaning backwards against a vertical ladder, to which he is firmly attached by the shoulders and pelvis, whilst the middle part of the back is pushed forwards with the hand.

All this is done slowly, methodically. So much so that this **very efficacious compression**, which is as energetic as you wish, is, nevertheless, **extremely gentle and very**

well tolerated. It produces no sloughing¹, instead of which, with an apparatus unopened behind, sloughing is nearly constant although the pressure be inappreciable.

II. — *The large plastered corset for Pott's disease.*

The large plaster encases the base of the skull.



Fig. 284. — Oblique occipito-mental cravat and woollen turn, the one as it were the equator, the other the meridian, to complete the protection of the head.



Fig. 285. — The method of rolling the first plastered strip round the head at the equator and at the meridian.

The **posture** of the patient, the **sustention** apparatus, and the occipito-mental **girth**, are just **the same** as for the medium plaster.

1. Or almost never; v. p. 71 and 74 the means of detecting and treating sloughs.

Here are the differences between the two apparatus.

The clothing. — As above, the jersey and woollen pad over the chest. In place of the circular cravat, you use here, to complete the jersey, an **oblique woollen cravat**, embracing the chin and the occiput, **following** consequently the **occipito-**

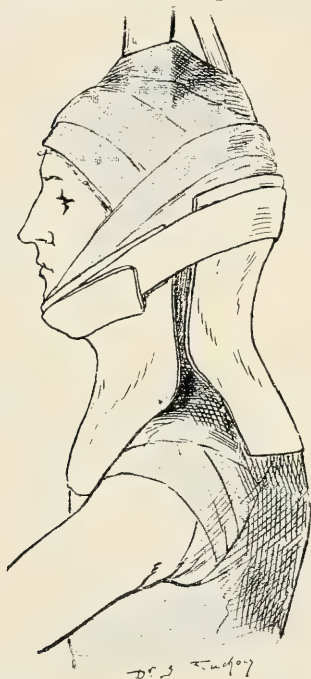


Fig. 286. — Strengthening squares and occipito-mental attelle placed in position over the first strip for the sub-clavicular portion of the large apparatus.



Fig. 287. — These two pads are fixed round the head with a plastered strip.

mental circumference (fig. 284). An assistant holds the two extremities of the cravat over the middle line behind, until the first turn of bandage has been applied. You complete the covering of the base of the skull by two turns of wool one centimetre in thickness, of which one is carried perpendicularly to the cravat, as an equator, from the forehead to

the nucha, the other circularly round the neck and the nucha.

Preparation of the attelles. — The two large pieces for the trunk are the same; but, instead of the circular cravat, we prepare two square pieces, of from 15 to 25 centimetres according to the size of the subject (having the usual three thicknesses); these will be placed, one in front, the other behind,

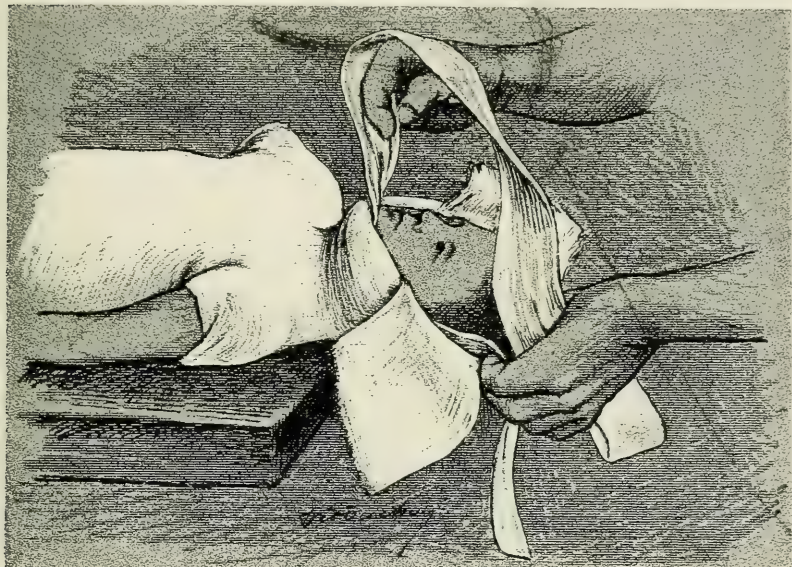


Fig. 288. — The upper end of the apparatus has been cut over the forehead and the two pieces turned over at the sides; remove the lateral pins of the girth which you can then cautiously pull away by making it slide. But if you have cut the two tails on one side, you have only to pull towards you from the other side; this second proceeding is much easier.

to make the armature of the cranio-cervical portion of the apparatus (fig. 286).

The application of the bandages.

The first plastered strip is rolled round the head in **meridians** and in **equators**, commencing rather by the meridians going from the vertex downwards to the jaw (fig. 285). You repass three times and cut the strip. Then you make three

or four turns at the equator, from the forehead to the nucha. Add two or three **circular turns, rather loosely round the neck.**

Afterwards, you roll one or two bandages over the trunk, as for the medium plaster (see above).

Application of the attelles. — The two attelles for the trunk are placed as in the preceding apparatus: the **two supplementary square attelles** are placed **the one before, from the chin to the two clavicles, the other behind, from**

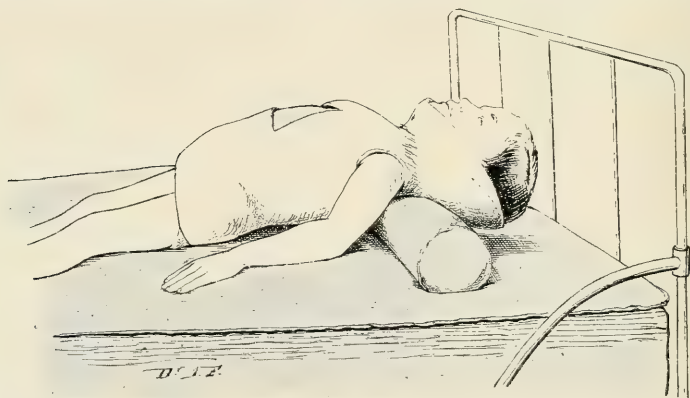


Fig. 289. — When the child is recumbent, place a bolster under his neck so that the top of the head does not rest on the bed.

the vertex to the scapulæ, encroaching, consequently, more or less extensively upon the large attelles of the trunk (fig. 286).

Then you keep in position the two attelles for the head by some turns of bandages in the meridians and equators (fig. 287) as above, and the attelles of the trunk by a bandage rolled in the form of an 8 in circular turns; lastly, you unite the head and the trunk by a few intermediary circular turns.

You use, in the construction of a large plaster, one or two bandages more than for the preceding, — according as you are dealing with a child or an adult.

After that you pass on to the modelling, which is done, over the shoulders and the pelvis, in the same way as in the first apparatus (fig. 271, 272).

It will not always be necessary to model the plaster with the hands over the chin and occiput; it models itself sufficiently if each turn of bandage in meridian and equator has been well applied (fig. 287); nevertheless, it is much better to model the jaw by passing the hand *horizontally* under the chin, in order that the plaster may make there a *plateau* rather than a funnel. You then wait until the plaster sets.

Afterwards you relieve the tension by removing the loops of the girth from the bar. At the end of ten minutes, lay the child down, placing the head a little beyond the end of the table, so as not to break the apparatus.

Trimming. — Take away (with a good knife), proceeding slowly, all the part of the plaster which is above the occipito-mental circumference. This allows of the withdrawal of the girth; to do this, take away the two sub-auricular pins and pull out carefully the chin portion first, then the other; or, better, cut with the scissors, on one side only, below the ears, the two tails, anterior and posterior, of the girth, and pull it towards you from the other side (fig. 288). It is much better to remove the girth than to leave it in position.

At the lower end, the large plaster is trimmed in the same way as the medium. A provisional opening is made afterwards (fig. 289) through which you withdraw the wool, as in the medium corset.

Three days afterwards, make a permanent opening, com-

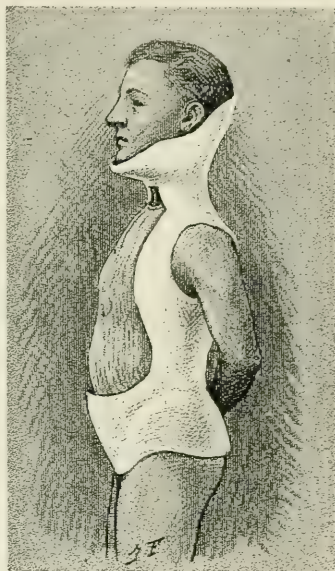


Fig. 290. — The large apparatus finished, with its opening, reaching up to the hyoid bone.

mening at the junction of the neck and the jaw ; the larynx being free in front, will not then suffer by compression which you may have to exert over the affected cervical vertebræ (fig. 279). Dorsal compression is effected in the same way as in the medium apparatus.

The construction of a plaster in paralysed subjects.

I have said that, not only Pott's disease of the superior regions, but also all the cases of **Pott's disease with paralysis**,



Fig. 291. — Extension of the spine in the horizontal position. An assistant models the apparatus about the pelvis. Two others make extension and counter-extension at the head and the feet, of from 10 to 15 kilograms.

are treated by the large plaster. Thanks to its funnel or plateau **the extension of the spine necessary for the cure of the paralysis** can be better and more exactly preserved than with the medium plaster.

The patient places himself in the degree of extension desired (v. fig. 246, p. 278) for, being unable to support himself on his feet (on account of his paralysis), but only and very imperfectly on the seat, he is somewhat suspended by the girth. If (the plaster being rather slow in drying) **the extension becomes too painful** towards the end of the sitting, you relieve him by discontinuing the vertical position.

You remove him, (at the same time as the bar) and **lay him down**. Then draw on the head, by means of the bar, with

both hands, with what force you wish (10 to 15 kilogrammes generally), whilst an assistant holds him by the feet (fig. 291). The apparatus is modelled over the pelvis as in hip-disease (v. p. 430). Then wait in this position for the plaster to set.

III. — *The small apparatus.*

The small apparatus is made in the same manner as the medium, but without the cravat and the neck piece. It is an apparatus for convalescence in Pott's disease of the lower vertebrae. But in truth, we use it very little even in convalescence. Generally, we make a medium plaster with a collar piece¹.

Attention required after the application of a plaster.

We have spoken of the trimming of the apparatus, of the openings, and of dorsal compression.

Sometimes patients (especially adults) are a little distressed for the first two days. You may calm² them by the mere administration of anodynes, for, to this discomfort will soon succeed perfect comfort.

You will leave the patient afterwards to the care of the parents;

1. Some remarks on the plaster corsets.

- a. In cases of *abscess* or of *fistula*, make an opening in the plaster.
- b. *Sloughing* (strictly speaking possible) : v. p. 351, the method of recognising and curing it.
- c. Is the age of the patient with Pott's disease, a contra-indication in the use of plaster? — No, one may plaster infants of one year (taking care to prevent soiling) just as aged people of more than 50 years.
- d. One may use *chloroform* (exceptionally) when constructing the plaster (v. p. 351).
- e. *Multiple fistulae* or very intolerant and eczematous skins necessitate daily attention; in such cases, one may convert the immovable corset into a movable one. (v. p. 350).
2. If the discomfort is too great, you may relieve it by dividing the corset in front in the median line so as to separate the edges by 1, 2 or 3 c. m. — but bring them together again and rejoin them two or three days later, when the patient has become accustomed to the apparatus.

the doctor has no need to see him again more than **once a month** to **attend to the dorsal compression** which is increased on each occasion by about $\frac{1}{4}$ of its amount.

Removal of the plaster towards the fourth month.

To remove the apparatus. — Place the child in an ordinary bath for a quarter of an hour. The plaster softens, and can be cut in a minute or two, with any kind of knife.

The toilet of the skin. — One makes it with ether or with eau-de-cologne, if the skin is neither soiled nor scaly. — In the ordinary case, one rubs gently with vaseline for a few minutes, which has the effect of softening the epidermic scales; after which one dries the skin with a piece of fine linen, very gently, and passes over it a little alcohol or eau-de-cologne. One cleanses the front, then the back, turning the patient over.

Search for abscess. — You look, by examining the back and the iliac fossæ, or, as the case may be, the neck and the pharynx, for any trace of abscess in formation.

THE CONTINUATION OF THE TREATMENT IN POTT'S DISEASE AND ITS DURATION

Placing the patient on his feet.

If no abscess supervene, everything is reduced to making a new plaster every $\frac{1}{4}$ or 5 months.

After two year's rest in the recumbent position, the patient is placed on his feet, provided that he is **not suffering** any pain, either **spontaneously**, or by **pressure on the back**, and that **his general condition** is so good as to allow you to think that the **vertebral focus** is extinct (or almost so).

CONVALESCENCE

The apparatus.

Then the patient is allowed to get up, wearing the same plaster apparatus. — Hospital cases keep the plaster

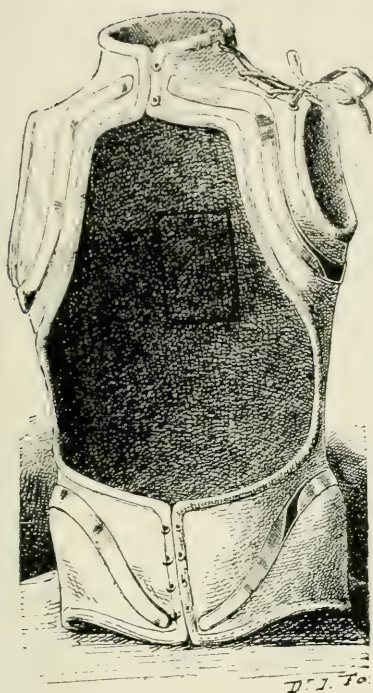


Fig. 292. — Medium celluloid apparatus. One sees the anterior part of the dorsal shutter.

the *spine* may be supposed to be *complete* and *definite*. This can be ascertained by a radiogram of the profile whenever practically possible.

In the case of town children, it is advantageous, when putting them on their feet, to replace the plaster by *removable corsets*, which allow of a thorough toilet, are lighter

on for 2 or 3 years longer as a minimum from this time.

It must be removed only when, for the last **2 or 3 years**, at least, pressure over the *vertebræ* no longer elicits the least tenderness, and the line of the back has not varied one millimetre, provided that the general condition of the patient is perfect. Under these conditions the *welding* of



Fig. 293. — Large celluloid apparatus for Pott's disease, cervical or cervico-dorsal.

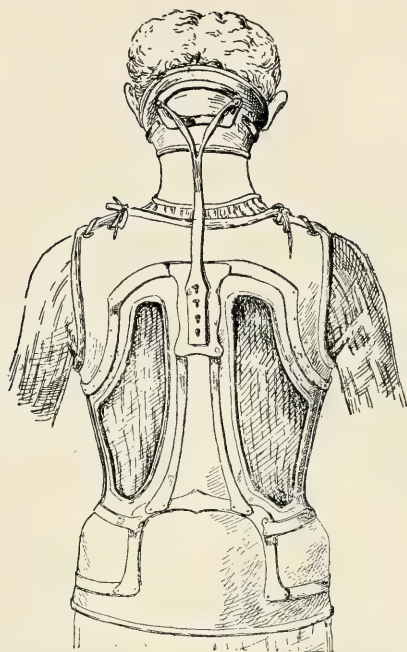


Fig. 294. — Celluloid apparatus with large collar, view of posterior aspect.

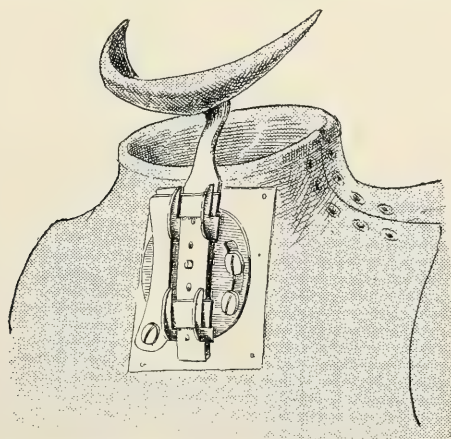


Fig. 295. — An arrangement for fixing the chin piece of the minerva.

than the plaster, and furnished, like it, with a dorsal opening and a shutter, which allow of continuance of the support and of the compression of the affected vertebrae (fig. 292 and 293).

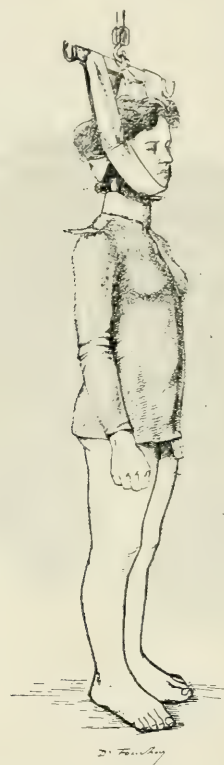


Fig. 296. — The patient may be dressed in a jersey, — two lathes underneath the jersey.

« Orthopædic » corsets.

The best from all points of view, are the corsets in **celluloid** (v. fig. 292 to 294).

It is better as I have said, to leave the rather difficult construction of these apparatus to special workers, and so, all that is left for you to do is to make a mould and fit the apparatus

on. This, each of you will be able to do quite easily after having read that which follows :



Fig. 297. — Placing in position the zinc laths which will serve as a protection when cutting the plaster.

Method of taking a mould of the trunk. — The patient dressed in a jersey with laths of zinc in position (fig. 296),

is supported by means of the girth; but be careful here to guard against « stretching » the patient until his heels lose touch with the floor; the tension should be much less, say almost nil, if you wish to have an apparatus in celluloid fitting

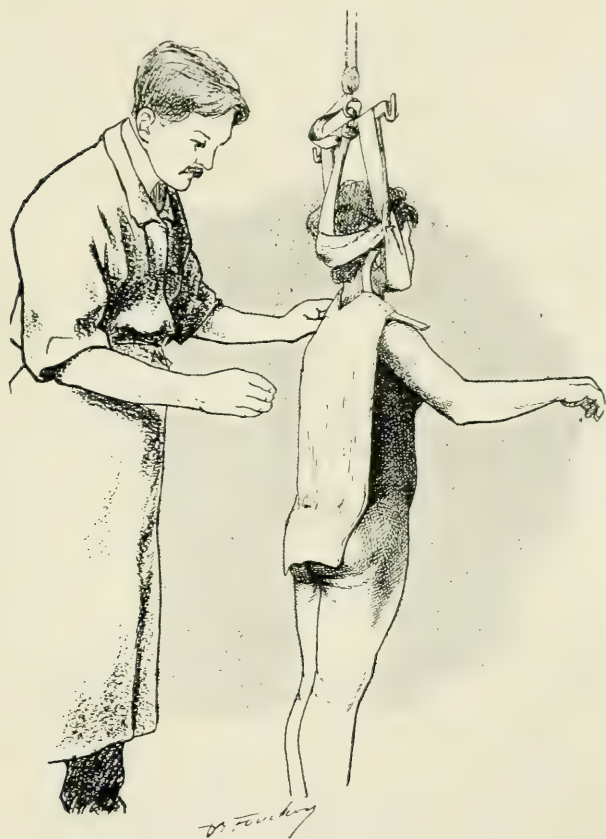


Fig. 298. — Application of the posterior attelle.

very precisely. Instead of commencing the moulding by means of strips, — as was done for the ordinary plastered corset, begin by applying the attelles. The dorsal attelle is placed in position first (fig. 298); in order that its edges adapt

themselves better over the sides of the trunk, make, if need be, several notches in it. The anterior attelle and the cravat are applied in the same way as is done in the construction of

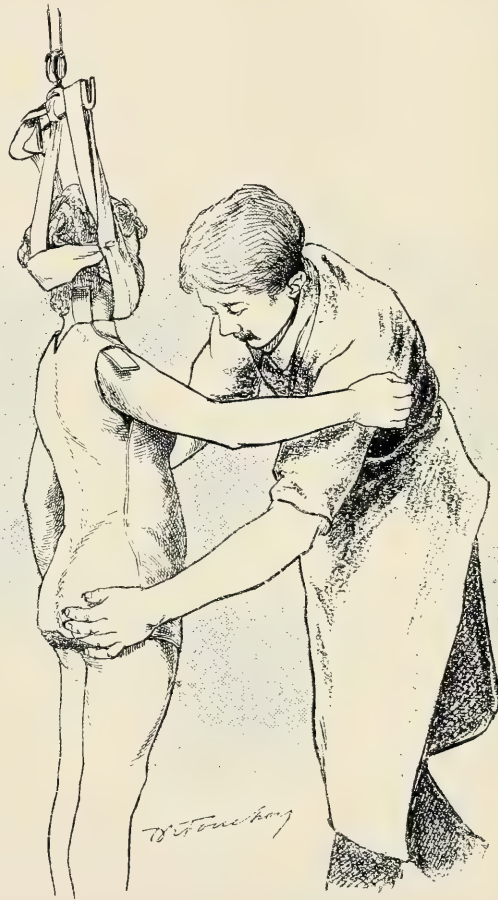


Fig. 299. — The two attelles are in position ; flatten them out carefully over the skin.

the ordinary plaster apparatus. Roll one or two strips over the attelles and between each layer of these spread a coating of plaster cream (fig. 300).

This will strengthen your mould. This done, verify and rectify, if necessary, the posture of the patient. You must, lastly,



Fig 300. — The attelles are held in position and adapted by a plastered strip.

whilst the drying is proceeding, model the contours of the pelvis, and to do that, your hand must embrace very exactly the iliac crests, as has been described in the construction of the plaster corset.

When the apparatus is dry, that is to say at the end of from 5 to 10 minutes, you cut it with a knife, following the zinc laths. After it is cut it is easy to withdraw the laths and to

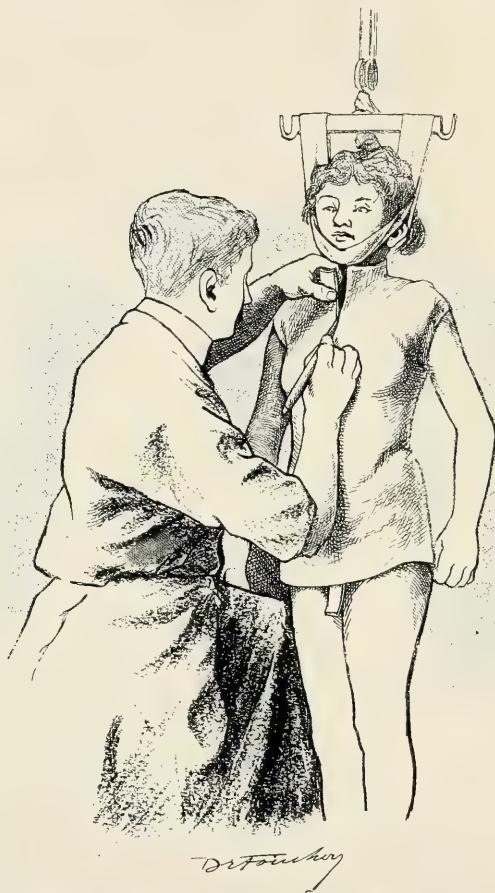


Fig. 301. — You divide the mould upon the zinc strips by means of a knife or a shoe-maker's tool.

open the apparatus sufficiently to allow of it's being removed (fig. 302 and 303).

When the moulding is completed, you carefully bring

together' the sides of the section and keep them in apposition either by enclosing the whole apparatus with several turns of



Fig. 302. — The laths have been removed; you commence to disengage the mould from the right side of the patient.

soft muslin bandage (fig. 304), or by applying a narrow plastered strip over the slit, covering the two edges.

In this case, it is necessary to keep the edges in contact until the plastered strip is dry. By this method the form of the trunk will be reproduced very exactly.

For greater security, you might — as we have already indicated — pack the interior of the mould with paper or with wood shavings. The mould will take 24 hours to dry com-



Fig. 3c3. — The mould is taken off as you would take off a waist-coat.

pletely; during that time, you will hang it up, or at least you will support it upright, for should it rest on one of its faces, it will run the risk of flattening and becoming out of shape.

Moulding a celluloid with a large collar. — You proceed in the same way when it is necessary to mould also the base of the skull (for Pott's disease in the cervical region); the only difference is that you complete the top part of the jersey by 2 or 3 turns of soft muslin bandage, going from the chin to the vertex and from the occiput to the forehead, so as to avoid the application of plaster upon the hair; let the zinc strips rise higher,



Fig. 304. — The edges of the mould are brought together by means of a bandage of soft muslin.

the anterior up to the point of the chin, the lateral up to above the mastoid region (fig. 305 and 306). While the apparatus is drying, you model the chin with one hand, the occiput with the other.

Method of fitting a celluloid corset. — The orthopedic apparatus maker brings you the corset, divided through the median line and over the two shoulders, so that you may try it on (fig. 307, 308 and 309). We have mentioned, in the generalities (v. p. 103), the utility of this trial.

Introduce the patient sideways into the corset, so as not to have to open the apparatus too much (fig. 307).

The corset is fastened, and the sides are approximated by

means of three leather straps encircling the trunk — one below the axillæ, the other at the waist, and the last at the level of the pelvis — whilst an assistant supports the apparatus above the shoulders. The straps are tightened so as to ensure the perfect application of the apparatus to the body; if the apparatus is too large, you let its edges overlap, and you mark



Fig. 305.



Fig. 306.

Fig. 305 and 306. — The method of procedure for moulding the cervical part, or the minerva.

with chalk, on the celluloid itself, the corrections to be carried out. Note also, the height to be given to the collar, the hollowing to be made at the shoulders, the openings required, either in front or behind.

As the patient wishes to be able to rest in a sitting posture, you mark the point where the apparatus should stop behind.

In the same way, to allow of flexion of the thighs, you note the height of the hollowings to be made, so that flexion of the thighs may have an amplitude of 80° at least.

To try on a *minerva*, mark out the occipito-mental line, indicating where the hollow has to be for the ears, and verify the curve of the nucha and of the neck.



Fig. 307. — Trial of a celluloid corset.
— First stage of putting on the corset.



Fig. 308. — Second stage of putting on the corset for trial.

Before finishing with the orthopœdic treatment

ONE WORD MORE ON THE CORRECTION OF GIBBOSITIES.

The correction of the gibbosity, that must be our aim. Indeed, according as we overcome the gibbosity or not, Pott's disease will cease to exist, or will remain the terrible malady that we know it to be.

a. Gibbosities small and medium.

What you must know is how to correct gibbosities at the stage they are in when presented to you for the first time.



Fig. 309. — Trial of the celluloid (continued). Tracing with black chalk the crossing points.

Even in the working class, children will be **brought to you**



Fig. 310. — Celluloid corset.
Without collar : front view.



Fig. 311. — The same seen from behind,
its dorsal opening closed.

shortly after the gibbosity has become **apparent** (and it is

very evident to everybody when there is a destruction equal to half or two thirds of a vertebra).

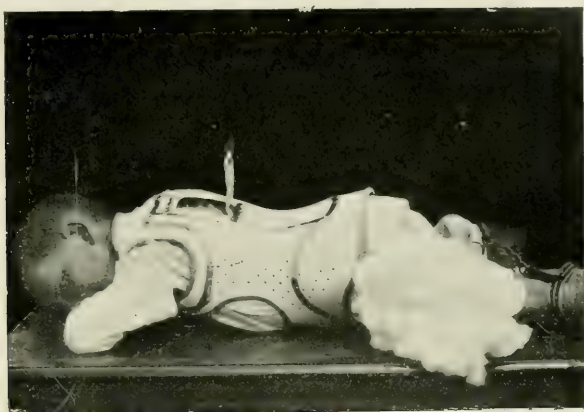


Fig. 312. — The method of making dorsal compression with a celluloid apparatus. The window open for the introduction of cotton wool squares.

Seeing that, at this moment, you can still hope for



Fig. 313. — The cotton wool squares, larger than the window and one centimetre in thickness, are introduced one by one, between the gibbosity and the sides of the opening.

the best by harmless and easy methods, we say that the problem of the treatment of Pott's disease is resolved

from the practical point of view, — in the same way as it is resolved for congenital dislocation of the hip, since, in children 2,



Fig. 314. — One introduces thus from 8 to 10 of these pads of wool, which form a prominence, the highest point of which is at the centre.

3, 4 years of age, we are able to cure it, although we may no

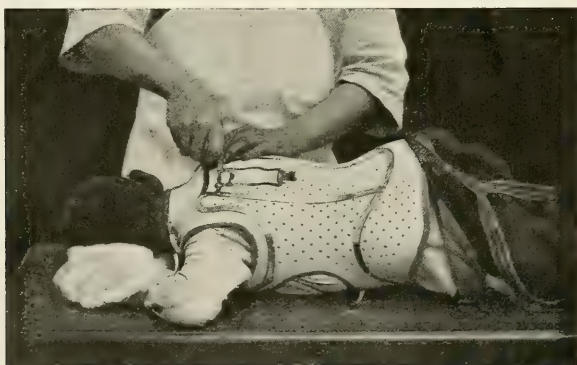


Fig. 315. — Flaps of the opening closed down over the wool. It is locked with a little key *ad hoc*. — This is the corset as it is worn.

longer be able to do so when the patient has passed a certain age.

We have seen that there are two methods of treating gibbo-

sities; **extension and direct pressure**; I recommend **especially the last**, because **extension** is much more **traumatising** and **more difficult** to carry out. It is also **less efficient** and less certain, it being impossible to keep it up thoroughly by means of the apparatus without injuring the patient at the chin. On the other hand, *direct pressure* is gentle, well tolerated, easy to carry out and to keep up, and very effective. Rely then on **direct pressure only, making no other extension but that which can be made without the heels leaving the ground**. In the second place you have seen that the **correction** is made in 10 or 15 **sittings**, and not **in one**. Correction by stages is gentler, more harmless and quite as effective. No time is wasted, seeing that the correction once obtained has, in both cases, to be maintained until the tuberculosis is cured and ankylosis produced, which requires several years. Therefore, nothing is to be gained by redressing at one sitting.

We have said that the compression must be renewed every month, until the gibbosity is effaced and the Pott's disease cured.

Duration of treatment of a Gibbosity.

A small or medium gibbosity in Pott's disease in progress may be effaced in from 6 to 12 months; this will depend upon the degree of the compression.

But the cure of Pott's disease, the anterior welding, is hardly ever secured before 3 or 4 years, — sometimes sooner, often later. It depends upon the general treatment and the gravity of the tuberculosis.

At any rate, one ought not to discontinue compression until the welding is complete and, even, has been completed for 1 or 2 years.

What is the criterion of the anterior welding?

The problem is the same, here, as after correction of a deformity in hip-disease or of white swelling of the knee. As

an absolute criterion there is nothing except the X rays, which shews the formation of the anterior callus (v. fig. 229). But it is difficult to obtain clear images of the profile, and



Fig. 316. — Double gibbosity. — In such a case a single opening is made corresponding to the two gibbosities and to the intervening segment, and compression is applied by means of three large pads (of which the dimensions exceed, as usual, those of the opening in the plaster).

moreover the great majority of practitioners have not a radiographic installation at their disposal.

In default of the X rays, there is the **clinical criterion** indicated before, namely, **perfect general condition, strict local treatment which has been continued already three or four years, absence of pain on pressure, a rigid back**

shewing no signs of having bulged, not even by one millimetre, for more than a year.

Remember that it is better to err by excess rather than by default of precautions; continue the use of the apparatus two years too long rather than discontinue its use two months too soon.

And then, when it is taken off, it must be taken off only temporarily, for a day or two at the commencement; therefore look at the patient pretty often, and at the first sign, that is to say at the first pain or slight visible flexion of the back, replace the apparatus for a fresh period of two years.

b. Old Gibbosities.

I have not advised practitioners who are not specialists to undertake in a general way the treatment of extensive and old gibbosities, and have explained why. It does not follow that a specialist can do everything in these cases. He will succeed (but at the price of what efforts!) in effacing, in course of time, $\frac{2}{3}$ or $\frac{3}{4}$ of the gibbosity, even when it is ankylosed. We know, in fact, that ankylosis is never complete before a number of years. On the other hand, experience allows us to affirm **that it is possible, even when ankylosis is complete,** to modify, in 3, 4, or 5 years, **the shape of the osseous block,** provided that the patient is a child whose growth has not ceased.

In fact, the osseous block undergoing from the fact of our treatment, a continuous pressure behind and a relaxation in front, will finish by becoming atrophied behind and hypertrophied in front. We are able thus, in a very notable degree, to regulate and direct its development, to steer it in a direction opposite to that it would have followed if it had been left to itself. For cases of very large and old gibbosities, one can say in all truth that **the more the treatment is prolonged,** up to the end of the growth of the patient, **the nearer it will approach perfection,** without of course reaching it. The length of treatment here depends then upon the result we are striving for.

In subjects who have arrived at the end of their growth —

when the gibbosity has become welded — there is nothing to look for in correction; one would gain nothing or next to nothing.

B. — TECHNIQUE OF THE TREATMENT OF ABSCESS

An abscess exists; you know where and how to find it. I have mentioned in what case to abstain from interfering

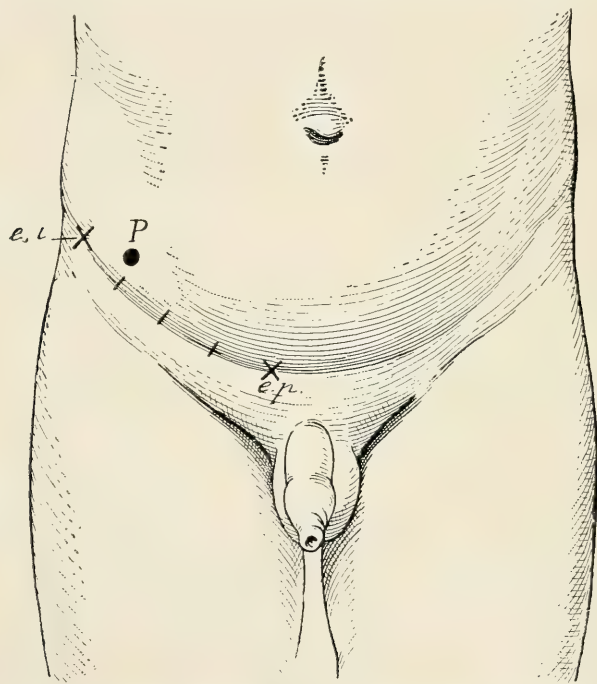


Fig. 317. — *e. i.* anterior iliac spine. — *e. p.* pubic spine. — *P.* point of election for puncture.

with, and in what case one ought to treat, an abscess. To treat it does not mean to open it; that, never! It is especially when it is a question of abscess due to Pott's disease that it is not advisable to open it nor allow it to open, because here, more than anywhere else, to open it may mean, and most often will mean, death.

If Pott's disease was so often fatal in former times, it was because the abscesses were opened. And if Pott's disease of the lumbar vertebrae was considered as more serious than

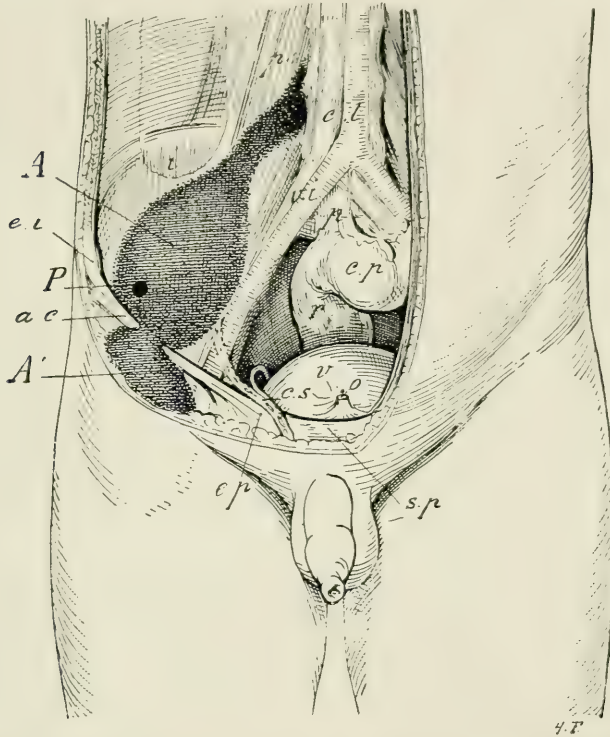


Fig. 318. — *e. i.* anterior iliac spine. — *e. p.* pubic spine. — *s. p.* pubic symphysis. — *a. c.* crural arch. — *c. s.* spermatic cord. — *v.* bladder. — *o.* urachus. — *p.* sacral promontory. — *v. i.* iliac vessels. — *c. p.* pelvic colon. — *c. l.* lumbar colon. *A' A'* abscess of wallet shape. — *P.* point of election for puncture.

Pott's disease of the dorsal vertebrae, the former being nearly always fatal, whilst the latter was scarcely ever so, it was due only to the fact that the first is accompanied by accessible abscess which one would hasten to open, whilst the second, presenting no perceptible abscess, would escape the bistoury and it's disastrous consequences.

Therefore, the sovereign dogma, the untouchable dogma, is

never to open an abscess in Pott's disease. The results of operative surgery in such cases are mainly disastrous. And of

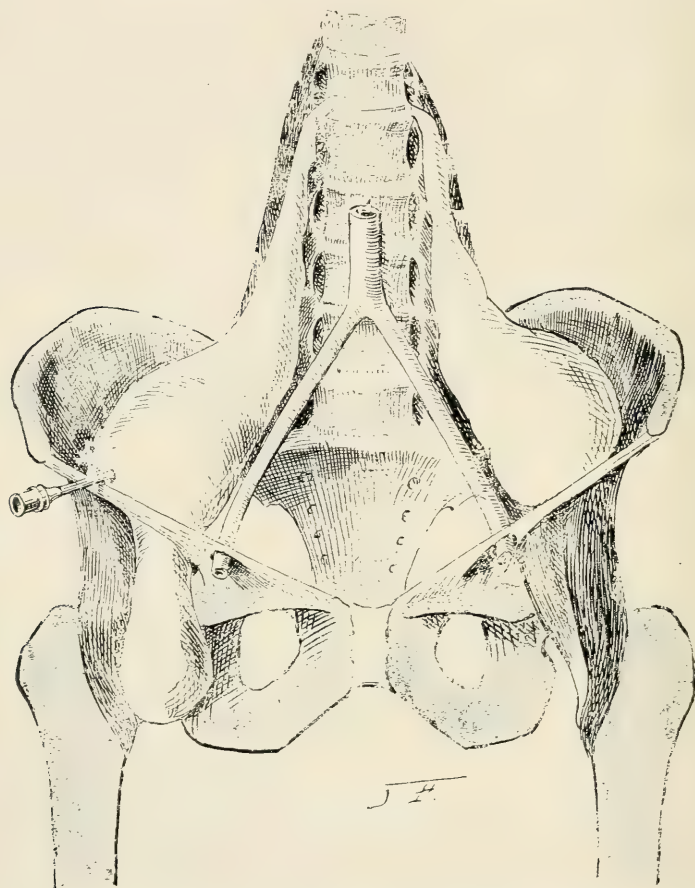


Fig. 319. — Abscess by gravitation. — On the left side, the abscess has invaded a considerable portion of the internal iliac fossa; on the right side, the pus has followed the psoas beneath the crural arch and formed a sac on a level with the lesser trochanter. The needle has been pushed against the upper edge of the arch, into the pelvic sac of the abscess.

all operators, the most brilliant, the most audacious, the most intrepid, will be here the most dangerous.

What must be done then?

Oh! it is very simple. If the abscess remains deep and not easily accessible, do nothing, wait. Two things may happen; either it will be reabsorbed spontaneously, or it will grow larger

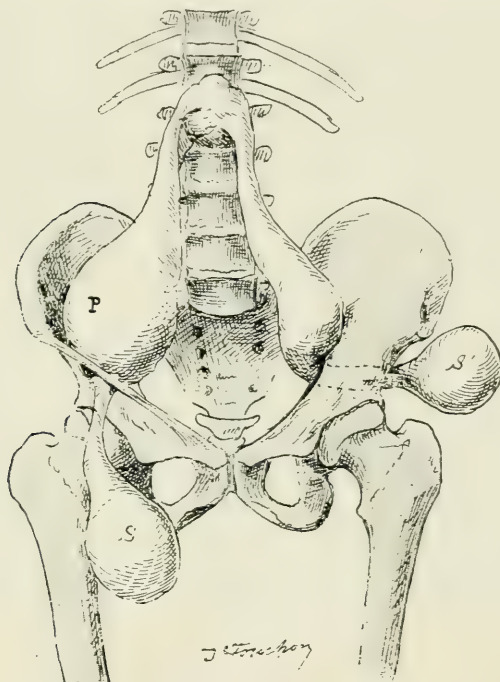


Fig. 320. — Two abscesses of wallet form. On the right the abscess is gripped under the arch and is pointing at the inner aspect of the thigh; on the left, it has passed through the great sciatic foramen and found its way into the fossa. To puncture at S S' would not always be sufficient; it would be necessary to puncture also at P, on the right side, close to the arch. On the left, treat the sac S' and compress it; if the pelvic sac is not cured, the pus will collect gradually in the internal iliac fossa where you will be able to attack it in course of time.

and become accessible. From this moment, and without waiting for it to involve the skin, treat it by puncture and injection.

I have only a word to add *à propos* of the peculiarities which abscesses in Pott's disease present.

1st The abscess in Pott's disease may, strictly speaking, be

infected from the beginning, independently of any surgical interference, small or great, independently of any fissure in the skin. The infection then comes from within, from the contiguity of the intestine (fissured or not). But be not afraid for you will



Fig. 321. — Puncture of an iliac abscess, through an opening made in the plaster apparatus, — one will push aside the flaps of jersey, and carefully protect with compresses of sterilized gauze, the edges of the opening, as was represented in figs 111, 122 and 124. (chap. III).

scarcely ever see this, as personally, I have seen it but 6 times in 20 years.

Signs of infection : Evening fever with marked morning remissions ; the contents of the abscess becoming sanguinolent, of the colour of tomato, or of wine lees.

Try to reduce the temperature by punctures without consecutive injections. I succeeded once, and in five other cases, to overcome the fever, I was obliged, after some time, to

open the abscess. Indeed, this opening must not be delayed too long as the viscera might, in course of time, become irremediably infected. Therefore, when the fever has persisted for 15 days, and you are certain it is not attributable to any intercurrent malady, do not wait, open and drain the abscess. Then treat as for infected fistulae.

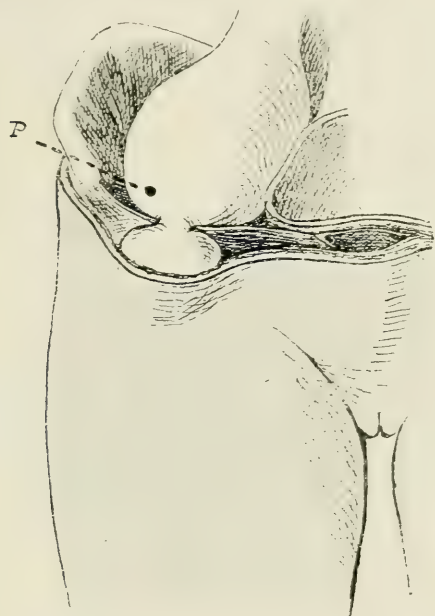


Fig. 322. — Abscess in the form of a mushroom or wallet which has perforated the deep layers of the abdominal wall and is spreading under the skin: in this case, it would be better to puncture the principal sac, as indicated by the dotted line P.

2^{ndly} Take care, in the abdominal abscess of Pott's disease not to inject diffusible liquid, producing too great a tension (iodoformed ether, oxygenated water). In spite of the fact that these very diffusible liquids may appear *a priori* preferable here, in that they would more certainly attack the affected points, they are to be avoided, because they might penetrate by breaking through into a visceral cavity, especially when its wall is altered and attenuated.

3^{rdly} When an abscess presents a principal sac and several diverticula, puncture the sac or diverticulum which is most accessible, making sure that you empty the entire abscess. If not, make punctures and injections into the large cavity as well as into the diverticula.

Peculiarities of Technique according to the seat of the abscess.

A. The abscess is situated near to blood-vessels.

At the fold of the groin, or in the cervical region (fig. 137 to 140, p. 149).

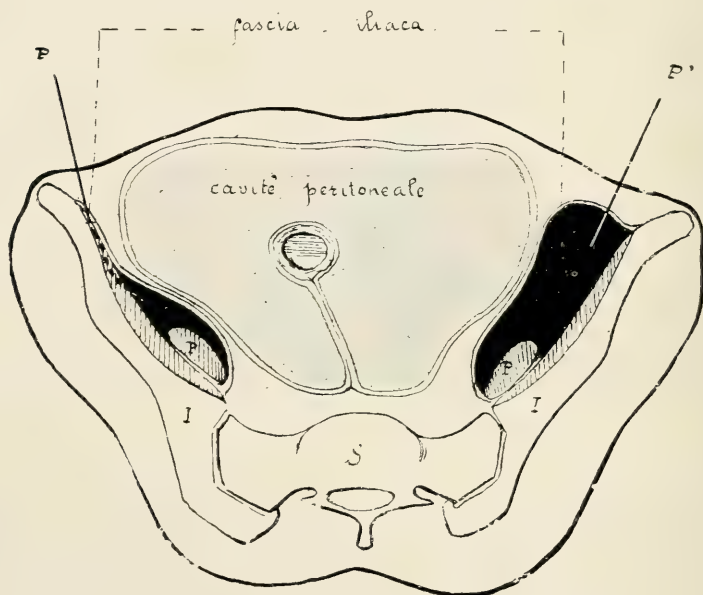


Fig. 323. — On the right, a large abscess has invaded the whole of the iliac fossa and pushed inwards the intestinal mass so that there is no risk of wounding it by puncture. On the left the needle P. has been pushed in, close by the iliac spine; its point travels, grazing the bone (following the dotted line), into the purulent collection.

B. Abscess of the iliac fossa. — You will generally interfere only in the case of very superficial bulky abscess, that

is one in which you can introduce the needle without having

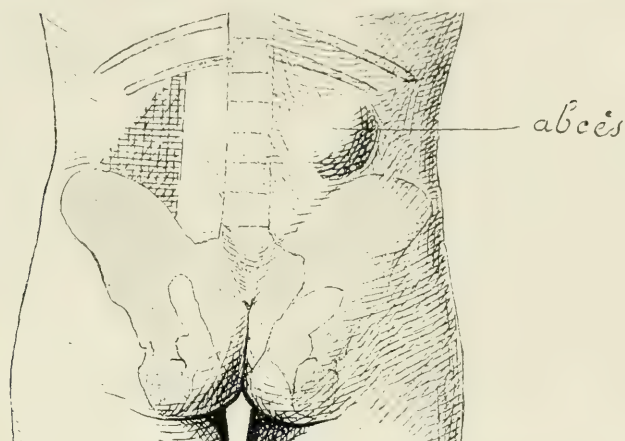


Fig. 324. — Abscess in Petit's triangle (figured on the left by cross-hatching).

anything to fear — I might even say anything to avoid.

But it may happen that one is unwilling to wait for the collection coming so near the skin, because that requires some-

*aponévrose prévertébrale
distendue par le pus
venu du corps vertébral*

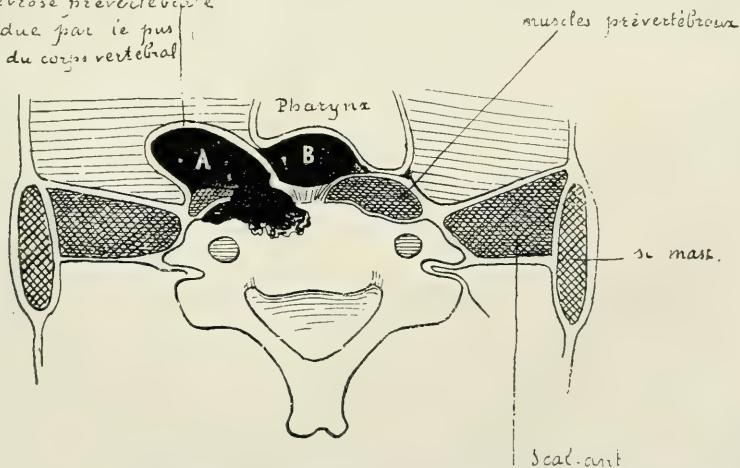


Fig. 325. — A. Abscess of vertebral origin situated behind the periosteum. — B. Glandular abscess situated in front of the periosteum.

times one or several years. It is **allowable to expedite matters provided** however that the abscess is already **sufficiently large** — as large as the closed fist, for example, — and

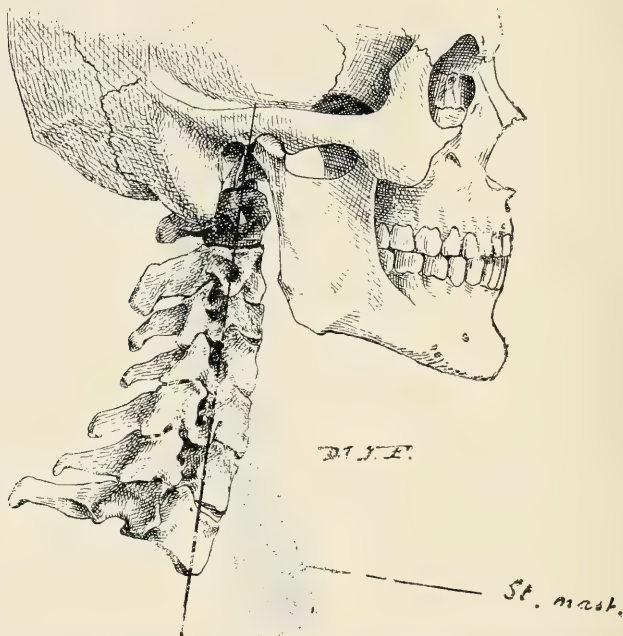


Fig. 326. — In order to puncture retro-pharyngeal abscesses, one marks out a line over the transverse apophyses, — The line of the apophyses of the first four cervical vertebræ is found to coincide with a vertical line running down from the external auditory meatus. One finger will push the sternomastoid muscle forwards.

undoubtedly in the iliac fossa. Do not forget that these collections are seated at the commencement in the very sheath of the psoas.

To reach the abscess before it has come near the surface of the skin you conduct your needle **immediately above the crural arch** and push it in, not directly from front to back, but upwards, at an angle of 20° or 25° (fig. 323).

You will feel when you arrive in the sheet of liquid.

C. Retro-lumbar abscesses (v. fig. 324).

The technique here does not present any difficulties.

D. Retro-pharyngeal abscesses (fig. 325).

To open these abscesses, as is done unfortunately nearly

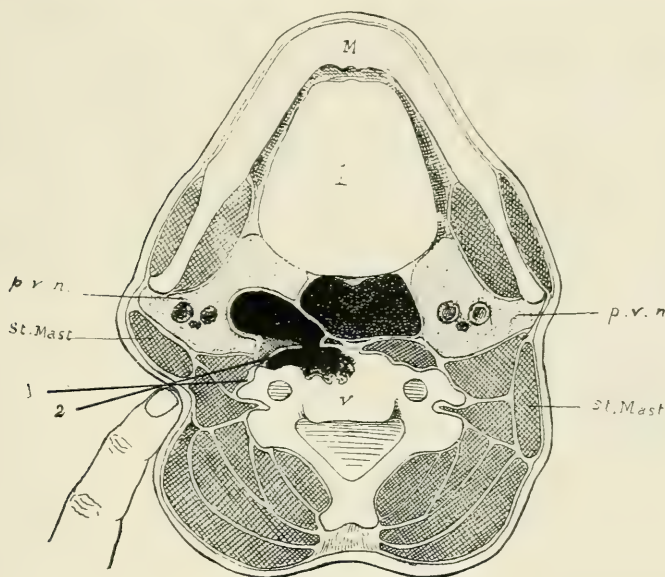


Fig. 327. — Puncture of a retro-pharyngeal abscess occurring in the body of the third cervical vertebra and not manifesting itself by any clinical sign in the lateral parts of the neck. — M. Inferior maxilla. — L. Tongue. — V. Vertebra. — p. v. n. carotid sheath. — The needle is pushed in front of the transverse process, it grazes the bone, taking first the direction 1, then the direction 2.

everywhere, is **nearly always fatal**, death being due to **infection**.

Do not touch them, unless your hand is forced by accidents of dysphagia or asphyxia — in which case you should not open the abscess, but you should puncture it.

You puncture it **through the lateral parts of the neck**, even when the abscess is not perceptible there.

Technique of the puncture of retro-pharyngeal Abscess.

To be quite sure of the immobility of the patient, anæsthetize him (unless you are dealing with a very reasonable adult).

You puncture against and in front of the **transverse process**

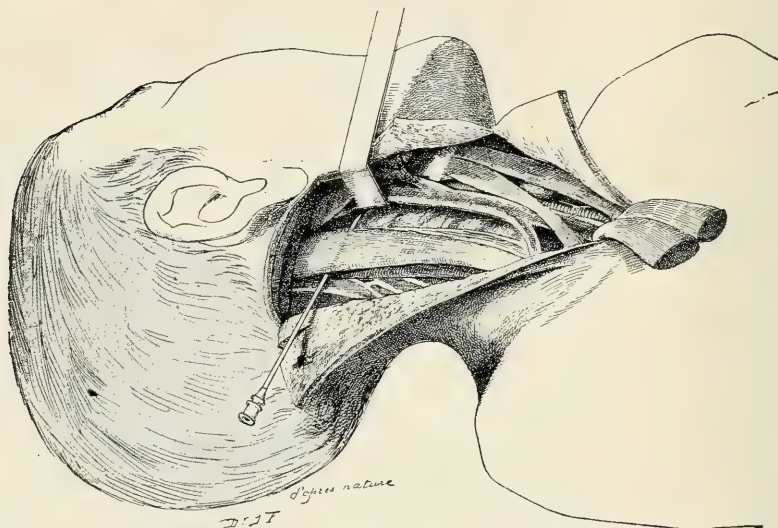


Fig. 328. — To show the track the needle follows : we have made on the cadaver some dissections of the region after the needle was introduced; one sees that it has penetrated within a hair's breadth of the anterior surface of the vertebræ, passing behind the prevertebral muscles; the carotid sheath which was lying in front of the muscles has been pushed inwards and forwards to allow of the point of the needle being seen.

of the axis, or of the **3rd vertebra**, which one **feels quite easily** (fig. 326); the needle **grazes the bone** and remains consequently **well behind the vessels** from which it is separated by the small prevertebral muscles (longus colli, rectus capitus anticus and obliquus superior) and thus arrives at the collection (fig. 327 and 328). Puncture, then inject oil, creosote and iodoform rather than naphtol, because a single injection of oil is often sufficient to cure the abscess

(and you will rarely have to repeat this delicate operation).

Duration of treatment of an abscess in Pott's disease.

The cure may be obtained in two months; but it is not necessary to go so quickly, take rather 3 or 4 months by making a puncture every 15 days (which obviates all fatigue to the patient).

Will the abscess return? — No, scarcely ever, provided that the general health is good and that you do not allow the patient to walk about before 6 or 8 months. If it should return, you would treat it in the same way.

What is the effect of treatment and cure of the abscess upon the treatment and cure of the Pott's disease? When the abscess is found to be in communication with all the affected vertebral bodies, it is evident that the liquid injected into the abscess cavity will touch all the affected points, penetrating the tuberculous granulations, dissolving them (naphthol), or transforming them into hard tissue (iodoform) and by its repeated and continuous action, completely improve the condition of the advancing osseous focus and thus ensure the cure of the vertebral focus itself. It is certain then that from the point of view of duration of the disease, one gains something by having an abscess by gravitation.

C. — TREATMENT OF FISTULÆ IN POTT'S DISEASE

We have described, page 225, how infected fistulæ are distinguished from non-infected.

In the **non-infected fistulæ**, make modifying injections of creosote, of iodoform and of camphorated naphthol, in the form of liquid or of paste, — as we have explained in chap. III (v. p. 176).

In the **infected fistulæ**, on the contrary, do not make modifying injections, they would be harmful.

In such cases, if there is no fever, you must learn to patiently await the closure — with, as the only treatment, aseptic dressings, rest, over-feeding and a sojourn at the seaside.

If the fever exceed 38.5° and persist beyond several weeks, endeavour to reduce it by improving the drainage of the pus.

But take care (even if the drainage is not sufficient) not to have recourse to great surgical interferences, on the pretence of making radical cures, because those operations give twenty times more chances of aggravating the infection and the fate of the patient than of ameliorating them.

Primo non nocere : an operation, necessarily incomplete here, would redouble the septic absorption and infection. Whilst if you do not operate, you leave the patient with a *chance of cure*. Sometime, indeed, you will see him cured.

Too often, we shall be powerless; the fever will persist and will, little by little, in several months or several years, cause in those patients visceral degeneration and death. For this reason, I wish to repeat it over and over again, you must do all that can be done to avoid fistulæ — namely; never open an abscess, and, by every means, prevent it opening spontaneously.

Nevertheless, all the fistulæ in Pott's disease have not the same sombre prognosis; it is much less rare for example, to see those of the neck cured than those of the lumbar region, owing to the relatively superficial position of the vertebral bodies of the neck, whence the greater facility of complete drainage in that region (v. p. 225).

Orthopædic treatment of fistulæ in Pott's disease.

Plaster the patient in order to immobilize the affected focus and to lessen pain, which is often severe. The apparatus should have an opening in it to allow of dressing — or it may be bivalve and removable (v. p. 350).

Medical treatment of symptoms : if there is albuminuria, milk regime. If there is fever, cryogenine, etc.

D. — TREATMENT OF PARALYSIS IN POTTS' DISEASE

The indication, as I have already pointed out (p. 270), is to remove pressure from the cord.

By so doing, the causes of the paralysis external to the cord are acted on, as well as the nutrition of the cord itself.

That is effected simply by the application of a large plaster. There is already relief from the pressure on the cord by the slight extension made during the application of the plaster, and this relief is further augmented by the pressure made afterwards upon the gibbosity.

The apparatus should be constructed with the trunk in a vertical position, but *supported* (v. fig. 246, p. 278), as shewn by my assistant, D^r Privat, in such a way that there is not too great traction on the head. Complete suspension would be painful, badly borne, and might give rise to sloughing.

If, on the other hand, the patient remain seated, he will not be fatigued, and you can leave the apparatus to dry with the trunk in the vertical position. That is a good condition for its being correctly applied and producing its full effect, besides causing no injury to the tissues, generally in a poor condition.

When the paralysis has reached up to the loins, sores may appear on a level with the pelvic girdle if the plaster is not very exactly applied, and produces, by its roughness, abnormal pressure at certain points.

Note that in the **case of incontinence** of the intestine and bladder, the plaster is easily soiled. It is necessary to take a thousand slight precautions to avoid such soiling and, from time to time, to take off the softened portions and replace them by new strips and new plaster squares, by which means it is possible even in the case of extensive paralysis, to preserve the apparatus which is so useful in relieving the spinal cord.

Treatment of symptoms. — If there are contractures of the limbs, you may combat them by continuous extension, or by small plaster apparatus. You contend against constipation by suppositories, simple enemata, etc., and against bladder retention, by diuretics, which suffice nearly always, without catheterism (v. p. 74, the treatment of **sloughs**).

SUB-OCCIPITAL POTT'S DISEASE

Authors devote a special chapter to the treatment of this particular condition. That seems to me perfectly useless, for there is nothing about it which is not contained in the preceding pages, either as to orthopedic treatment (see : large apparatus), or as to the treatment of abscess (see p. 147 retro-pharyngeal abscess), or as to the treatment of paralysis.

POTT'S DISEASE IN AN ADULT

In the same way we do not see any necessity for adding a chapter on Potts' disease in the adult, in spite of its great frequency (even at an advanced age).

It is sufficient to know that the absence of gibbosity is less rare in **Pott's disease in the adult** than in that of the child, — that the **disease is announced more often by spinal pains or girdle pains of terrible acuteness**, — that **these pains may precede by several months, and even by one or two years, the appearance of the gibbosity**, — and that **such unexplained sufferings should make you think** (even without a gibbosity) of a **possible Pott's disease**, for the other signs of which you will search. (see diagnosis p. 246). **Think also of Pott's disease, in the presence of every cold paraspinal abscess, or of paralysis supervening without appreciable cause, in an adult as well as in a child.**

The **treatment** is the same as in children.

It is necessary however for us to accord special attention to these cases of Pott's disease in the adult which **go on** for eight, ten or fifteen years, with girdle pains or pains in the members, remittent or continuous pains which produce the effect of rheumatic pains. (This **form** is seen **also in children**, but **much more rarely than in adults**).

What is to be done against this, fortunately, exceptional form?

We cannot condemn these patients to the recumbent position for fifteen years! Let them walk about, but not without a good corset, and forbid all fatigue.

You will contend directly against the symptoms of pain by counter-irritation over the spine or over the limbs, by cautery or continuous extension of the lower limbs, made during the night, etc.

We shall see that these forms of dry caries which persist indefinitely, can be found in other parts of the skeleton. But, in the spine, the pain may be due to another cause.

Treatment of gibbosities in the adult.

a) Gibbosity which is in progress (with all the signs of a vertebral focus still in activity) : one arrests and corrects it as in a child.

b) Gibbosity already ankylosed (one which has not increased more than a millimetre for at least two years, but which offers at the same time the other signs of an extinct Pott's disease) : there is **nothing** or **almost nothing to hope for in attempting its correction**. — But you will nevertheless put on a corset if the patient complains of erratic pains, in order to endeavour to attenuate them; for it is possible *even in Pott's disease which is welded and extinguished*, to have neuralgias of the trunk and of the members, due to pressure on the nerves at their exit from the spine, — the cause of the pressure persisting for a longer or shorter time after the cure of the tuberculous focus.

The bivalve plaster (v. p. 158) renders some service in adults intolerant or emphysematous.

POTT' DISEASE CO-EXISTENT WITH OTHER TUBERCULOUS AFFECTIONS (hip disease, etc.)

In all these cases you will treat the Pott's disease by a corset (plaster, at first; celluloid, later).

If it is a coxitis (v. p. 174) without pain or deformity, extension will be sufficient to keep the leg in good position. If, on the contrary, there is pain and deformity, make a plaster which you will join on to the plaster corset. In all other cases (v. p. 667) you will carry out the treatment of the two affections at the same time.

APPENDIX TO CHAPTER V

Three additional notes upon the treatment of Pott's disease.

1st The removable plaster corset.

It is very easy to construct. Make an ordinary plaster corset, using cold water without salt, and when dry, after a few hours, or the next day, divide it by symmetrical lateral incisions, into two valves, anterior and posterior. (fig. 329.)

To avoid the risk of damaging the skin in cutting the plaster, you will

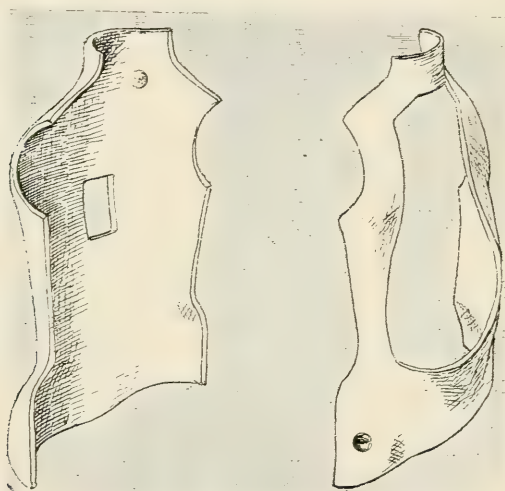


Fig. 329. — A medium bivalve plaster.

place over the jersey, at the level of the four lines previously chosen for the incisions, woollen strips, or better, zinc strips, the same as those used for moulding.

The jersey, which remains adherent to the inner surface of the apparatus, will serve as a natural lining.

In order to apply the removable plaster corset, you replace the two pieces, so that they are in perfect contact at their edges, and you keep them so either with straps, or with some turns of gummed muslin, moist and squeezed out; better still with laces passing round dressmaker's hooks. These are stitched to strips of linen which have been fastened to the edge of the apparatus with

the plaster cream, or with silicate, or even with ordinary glue. (fig. 283.)

You should use the removable apparatus only in very limited cases, namely, when there are numerous fistule, or a skin needing daily attention, or again, in an emphysematous or neurotic person who will only be able to become accustomed to the plaster gradually, keeping it on at the beginning for a few hours only every day.

2nd. Upon sloughs.

We have described (p. 72) what are their causes, their situation and their treatment. We have only one more word to add here.

If the slough is situated over a gibbosity, do not cease compression for a single day; for, if the compression is **regular**, it will not hinder the cure of the child, and thus you will have lost nothing from the point of view of correction of the gibbosity. If the slough is situated at the chin, you make a



Fig. 330. — Strip of linen with hooks which you glue to the edges of the plaster.

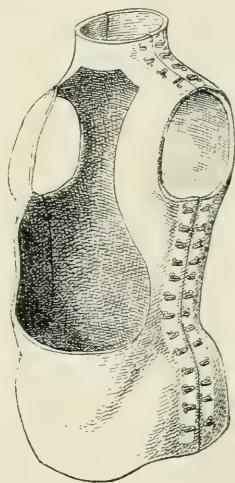


Fig. 331. — Removable plaster, completely finished.

notch in the plaster at this point to allow of its dressing. All this you anticipate.

3rd. On the use of chloroform in applying the plaster.

Sometimes little children throw themselves about violently under the sustension apparatus; to prevent traumatism of the morbid focus, anæsthetise them. You may put them to sleep in the upright position, held by the strap.

immobilising firmly the head and trunk, during the first whiffs of chloroform.

Contrary to what is generally thought, chloroform is wonderfully well tolerated in an upright position, when the chin is kept raised as it is by the strap. The last bandage being rolled, you lay the child on the table to dry the plaster, for if it should dry in the upright position, under the anæsthetic, the trunk would be too much extended. Whence, a little risk of ulterior slough beneath the chin, (if you are preparing a large corset), and the apparatus would perhaps be too tight.

You may also, in order to lessen the traction produced by the weight of the body, put children to sleep, and apply the plaster in the **sitting position** rather than in the **upright**.

That will be better so. Restless children will (like cases of Pott's disease with paralysis) be kept seated on a bicycle saddle as represented in fig. 245, p. 278.

CHAPTER VI

HIP-DISEASE

*A word on the symptoms, the prognosis and diagnosis
of hip-disease*

Hip disease is tuberculosis of the hip-joint.

The minute tubercle may rest silently for several months, then, one fine day, it makes itself known by certain **pains** in the hip **or the knee**, or by a slight **limp** (due to cramp in the peri-articular muscles).

Clinical characters.

A. **Deformities.** — The pains and the limp, intermittent at the beginning will soon be almost continual; and a deformity appears, scarcely appreciable at first, then very distinct. There is a saddle-like curve in the lumbar region, produced by a flexion of the thigh; there is a slight lengthening of the leg, produced by abduction of the thigh.

Thus, **at the beginning** of hip-disease, the **affected leg appears to be the longer**, because it is in abduction. **Later**, the affected leg will appear the shorter, because it will be adducted.

At the last period of the disease it will often be **really shorter** by reason of atrophy of the bone and partial destruction, or even complete destruction, of the articular extremities.

B. **Abscess.** — The tuberculosis may break down the barriers of the articulation and be carried towards neighbouring parts, in all directions, leading to abscesses which, if they are not prevented, will cause ulceration of the skin and open outwardly, producing fistulæ.

C. **Fistulæ.** — These easily become infected, whence there is danger to life, not so great, however, as in the case of fistulæ in Pott's disease.

D. **Luxations.** — By reason of the wearing away of bone and the articular dislocation which is brought about by the tuberculous

process, it may produce, not only deformities, but veritable luxation of the femur upwards and backwards.

The disease will thus terminate with deformity and very ugly

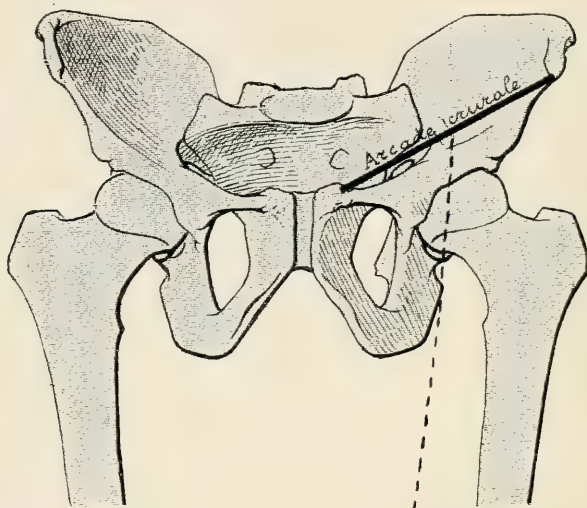


Fig. 332. — Normal hip-joint. — The relations of the crural arch and the artery with the skeleton.

shortening unless the patient is carried off by the visceral degenerations caused by the infected fistulæ.

What one knows very well, however, is that hip-disease does not follow this course unless it has not been (at least not carefully) looked after, and that, even in the case where it has not been treated, it may be arrested spontaneously at some one of the stages indicated above.

Prognosis.

But the prognosis of hip-disease changes altogether when it is well attended to.

1st. We can prevent or correct the deformity and thus prevent luxation.

2nd. We can prevent the opening of abscesses, which means the formation of fistulæ; and in doing away with fistulæ we do away also with the great danger to life which threatens the patient.

3rd. We can prevent the destruction of the articular extremities in hip-disease taken in hand at the beginning.

But that which we are unable to prevent absolutely in every case, is the stiffening of the hip joint, or again, the formation of an

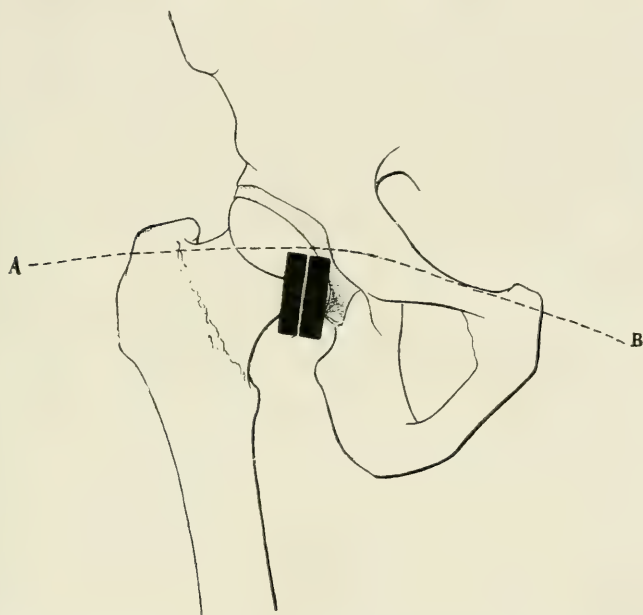


Fig. 333. — The normal hip joint. — Relations of the head of the femur to the vessels. — The stippled part above the accessible zone of the head represents the cotyloid ligament. — The two thick dark tracks are the artery on the outer side, the vein on the inner. — The artery crosses the head at the junction of its inner third and outer two thirds.

abscess and the production of a certain amount of atrophy of the bones of the lower limb, the consequence of which is slight shortening.

Nevertheless, shortening and ankylosis will not supervene, except in neglected patients, and in some cases of hip disease of a serious character; in the other cases we can, if we have attended to the patient very early, secure him a normal or reasonably normal limb; moreover a coxalgic, cured with a shortening of one or two centimetres and a stiff hip joint, is able to walk well (for a length of time and correctly).

The duration of the disease.

It lasts approximately one year in the benign forms; from two to three years in the ordinary forms¹, with or without abscess — and 4, 5, 6, 7, years and more in certain forms of dry caries without

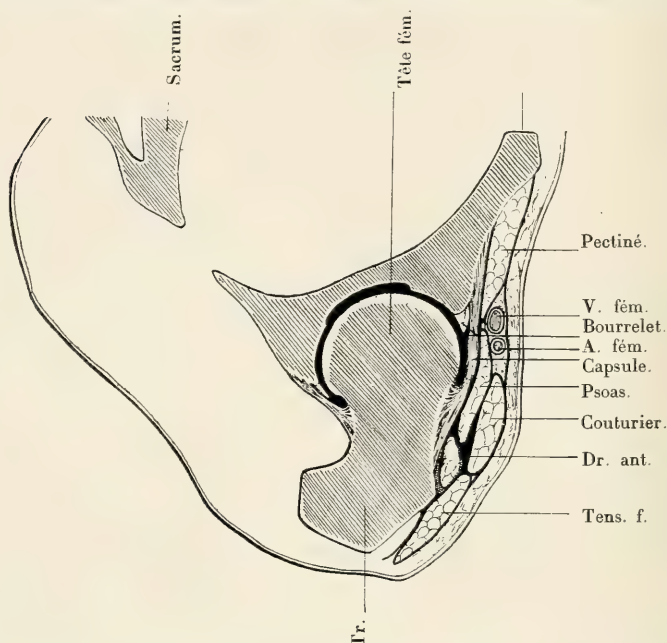


Fig. 334. — Normal hip joint. — Horizontal section of an upright subject through the line A. B. in the preceding figure.

abscesses, which progress with an extreme slowness and seem to go on for ever.

Diagnosis.

It is only difficult sometimes, at the onset of the disease.

Aphorism. — When you are consulted with regard to a child or an adolescent who, without appreciable cause, has been taken with **limping** or **pain** in the hip or in the **knee**, think of the possible existence of hip disease and satisfy yourself of the correctness of your diagnosis, by examining the subject completely naked.

1. We shall see that with early injections the duration of hip disease is reduced by more than two thirds.

Make him lie flat on a table and find out if he has pain on pressure of the hip, or a limitation of movement, particularly of the movement of abduction.

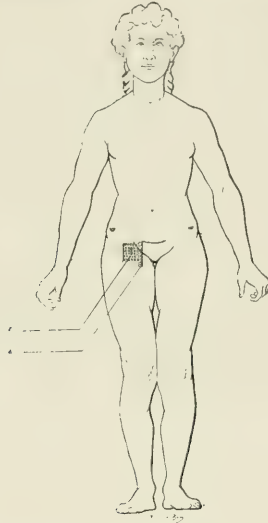


Fig. 335. — *a*, Femoral artery. — *z*, Zone, outside the artery, where one must press in seeking for pain on pressure of the head of the femur.



Fig. 336. — One presses with the index finger in searching for the pain.

1st. *Look for pain on pressing the head of the femur (v. fig. 335 to 337). Run your index finger in front of the suspected hip joint, along the fold of the groin, at one centimetre outside the*



Fig. 337. — Examining the sensibility of the head of the femur by pressure over its outer side. The index finger is pushed inwards at a centimetre above the upper border of the trochanter.

femoral artery which you will feel beating. You are right over the head of the femur.

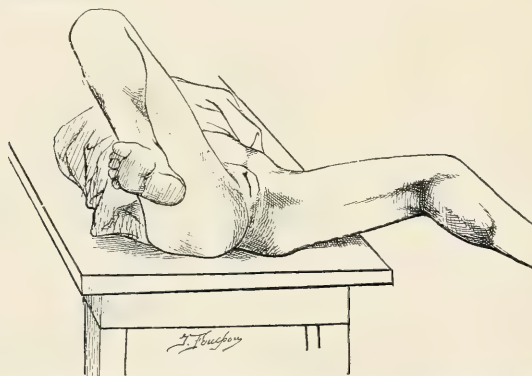


Fig. 338. — The second sign of any kind of arthritis of the hip. Here one sees limitation of abduction on the right side (affected side) compared with extreme abduction on the left (sound) side.

Press upon it gently : if the patient gives a cry it is useless to persist ; otherwise, press more firmly, until the patient complains.

And find if, on making an identical pressure over the head of the femur of the other side, at a symmetrical point, you provoke an exactly similar sensation there.

Do this again, if need be, five times, ten times, pressing first on

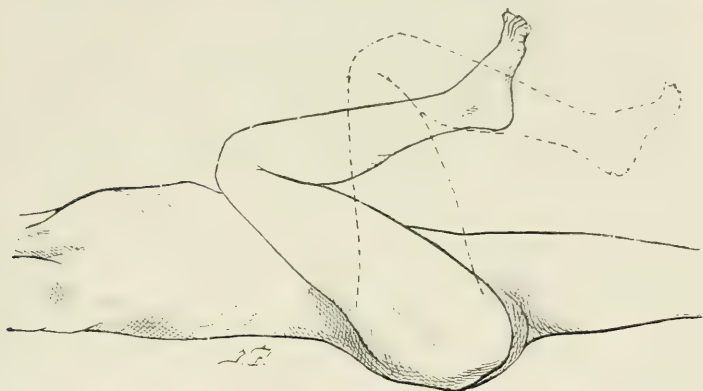


Fig. 339. — Limitation of movement of flexion represented by the dotted line. — The printed lines show the extreme normal flexion.

the one side, then on the other until you are certain whether there is or is not a difference between the two sides.

2nd. Search for limitation of movements (fig. 338, 339, 340). —

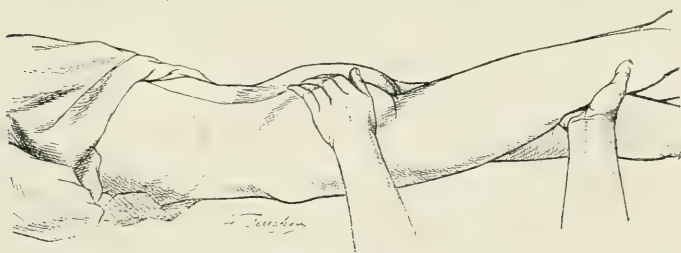


Fig. 340. — Limitation of movement in extension and the manner of making the examination.

You fix the pelvis with one hand and with the other you take hold of the knee, the leg being flexed on the thigh, and you move the limb in different directions up to the extreme limit of movements possible : flexion and extension, etc. For abduction, you commence the movement by a direct flexion of the thigh up to an angle of 90°: then, from that you move the thigh in abduction, as far as possible.

Compare the extent of the movements on the two sides; then again



Fig. 341. — Lengthening of the affected leg (right). Notice there is no longer only arthritis of the hip of some kind, but true coxitis.

repeat the proceeding, ten times if necessary. If there is **pain** on

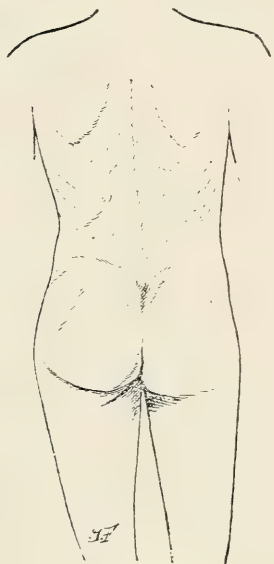


Fig. 342. — Lowering of the fold of the buttock on the side affected indicating also lengthening. On the other hand, the projection of the trochanter is more marked on the sound side.

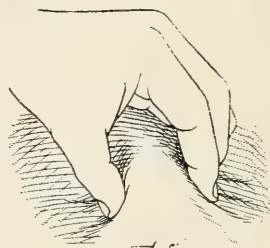


Fig. 343. — Atrophy of the thigh, another important sign (though not pathognomonic), of true coxitis. The thickening of the skin is the indication of this atrophy of the thigh. The cutaneous fold is thicker on the affected side.

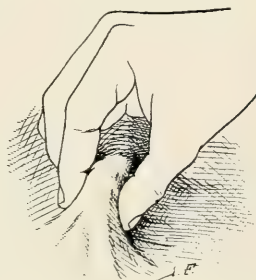


Fig. 344. — Cutaneous fold thinner on the thigh of the sound side.

pressure, and a limitation of the movement of abduction, you may be sure that the hip is diseased.

But how do you know it is real coxitis?

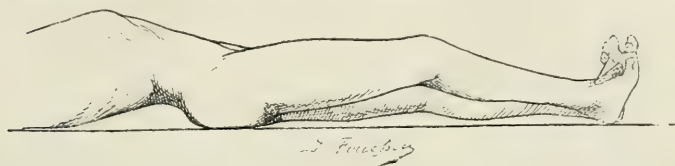


Fig. 345. — The most frequent condition — Lumbar hollowing and flexion of the knee, very apparent on the first examination.

By the existence of lengthening (apparent) of the affected limb.
 3rd. Look for lengthening of the limb. (Pathognomonic sign.)
 (Fig. 341 and 342.)

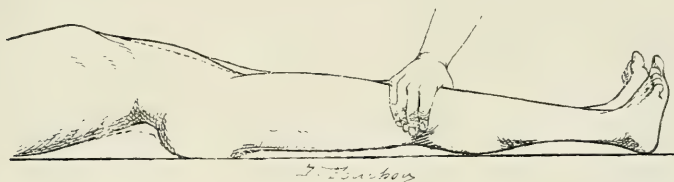


Fig. 346. — The same. The hollowing is more pronounced when the knee is pressed upon (the dotted line indicates the original hollowing).

Without paying particular attention to the position of the two iliac spines, bring the two heels together and see if the internal

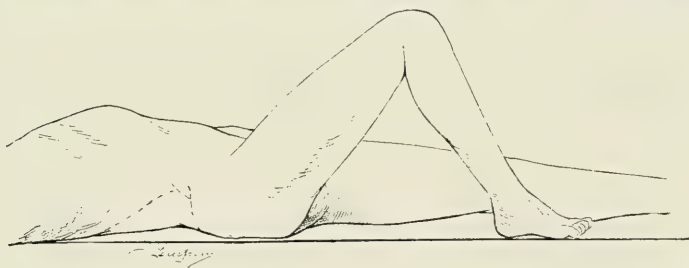


Fig. 347. — The same. The hollow disappears on flexing the knee further (the dotted line indicates the original hollow).

malleoli and the heels are on the same level. If there is a difference of a few millimetres, that suffices to confirm the existence of hip-

disease, at the outset; for later, we repeat it, there is, on the contrary, shortening of the affected side.

Failing the characteristic lengthening, you will make the diagnosis by the existence of some small **glands** in the groin of the suspected side, by slight **atrophy** of the muscles, or **thickening** of a fold of **skin** on this side (fig. 343 and 344), by the **absence** of any **history of injury**, or of **scarlatina**, or of **rheumatism**, by the insidious onset and the characteristic intermittence of the symptoms, by the general condition and the bad antecedents of the patient, etc. In doubtful cases, reserve your diagnosis and ask to see the child again. If then you find, after a few weeks, pain on pressure and limitation of movement, you will conclude it is hip-disease.



Fig. 348. — The same. — Right coxitis. — Abduction and lengthening very apparent on standing upright; the patient bends naturally the knee on the affected side.

Differential Diagnosis.

a. Diseases not affecting the hip : *White swelling of the knee, or sacro-coxitis, or Pott's disease.*

You must **always think** of these, that is to say that after examining a hip-joint, you ought to **examine the pelvis, the lumbar column and the knee**. If the disease is situated in those regions, it is there and not in the hip that you will

find the most apparent characteristic signs; pain on pressure over the bones, limitation of movement, etc.

b. Other diseases of the hip-joint.

Osteo-myelitis of the hip begins with great constitutional disturbance and a temperature of from 39° to 40° , etc.

Infantile Paralysis. There is no rigidity (on the contrary abnormal laxity), no pain on pressure. — Atrophy and enfeeblement of muscles greater than in hip-disease. The history.

Congenital Luxation. The affected leg is not longer but shorter;

— the child was late in walking, has always had a slight limp, a sort of dip; no pain. You no longer feel the head of the femur in front against the artery: at its usual place there is a void, but one can feel the head more or less displaced, outwards and upwards, against the anterior superior iliac spine (v. fig. 789).



Fig. 349. — Very marked deformity, in abduction, lumbar hollow and flexion of the knee.

Hysterical Coxitis... But this is so rare!... Do not deceive yourself! it nearly always masks a true coxitis.

Rheumatism. In the hip as in the spine, mistrust those mono-articular rheumatisms which seem to last for ever. The same



Fig. 350. — The same. — The hollow is effaced when flexion of the knee is increased.

remark applies to the so-called “*growing pains*”. How many true hip diseases have been, at the beginning, mistaken for rheumatism, growing pains, sprains!

However, do not exaggerate the difficulties of diagnosing coxitis. In reality, there is **generally none** in practice. When you are dealing with a true coxitis you will nearly always notice at your first examination (beside the signs we have indicated above):

1st, a very apparent lameness; — 2nd, a vicious attitude characterised by flexion of the thigh and a lumbar hollow, together with abduction of the limb (fig. 345, 346, 347, 348, 349, 350); — 3rd, a fungous puffiness of the region of the joint; — 4th, a limitation (more than a half) of the physiological movements; — 5th, very evident pain on pressure and on movement, etc.; that means that you will find many more signs than are necessary to confirm the existence of hip-joint disease.

A WORD ON THE ANATOMICAL LESIONS

BASED UPON RADIOGRAMS IN MY COLLECTION AND ON THE THESIS
OF MY ASSISTANT AND FRIEND D^r FOUCHOU

Sur la Radiographie dans la Coxalgie, Paris, 1906.

All you have to keep in mind are the following ideas : —

Placing yourself at the practical point of view, you may consider in hip-joint disease **two anatomical forms** : one where the **contour** of the joint and the bony formation are **entirely preserved**; the **other where there is a softening** of the head and roof of the cotyloid cavity leading to a **gradual breaking down** of the osseous extremities, in the course of 2, 3, 4, 5 years.

The first form terminates without shortening, but the second leaves an inevitable shortening which extends generally to 3 or 4 centimetres.

Let us go into details.

The **first variety** comprises the benign and recent cases (see further on upon hip-joint disease of 1st form.) which have been well cared for from the beginning; here, the lesions are always synovial and the bones are scarcely « touched », if I may say so, by the tuberculous process (fig. 351 and 352).

The **second variety** is more frequently the actual condition of things; it comprises hip-joint disease of the second, third, fourth, fifth and sixth form. The tuberculosis here is more serious, either because from the onset it was essentially more malignant, or, chiefly, because it **has not been looked**

after from the first hour of its existence, or else, it **has been badly looked after.**

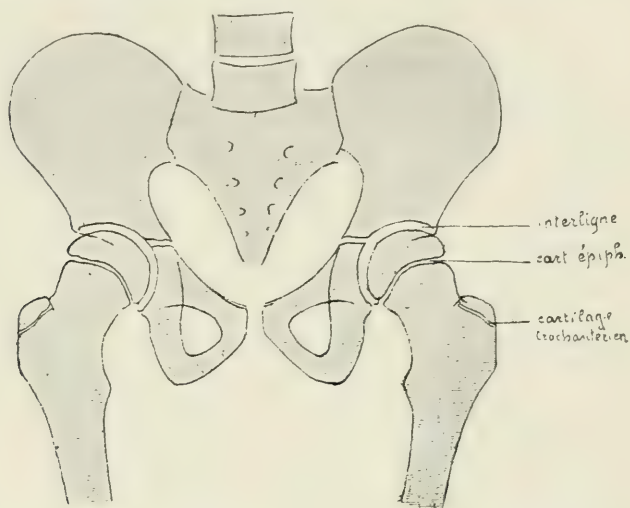


Fig. 351. — Radiogram of a case of left hip-joint disease of the first form, without any appreciable osseous lesion, in spite of the fact that, clinically, the diagnosis, was not in the least doubtful. It was very probably a coxitis exclusively synovial.



Fig. 352. — Another case of left hip joint-disease of the first form. There is no alteration in the contour of the bone, but only a diffuse decalcification on this side shewn by a lighter shade. — The femur is in abduction.

Tuberculosis sometimes excavates one or several small

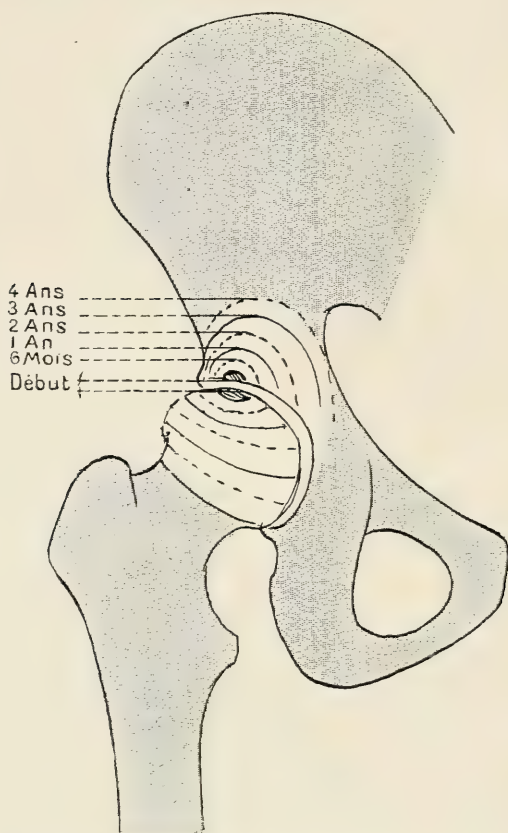


Fig. 353. — Schema of the osseous destruction in the 2nd, 3rd, 4th and 5th forms of Hip joint disease. From the primitive core, the destruction spreads by successive concentric zones as far as the iliac bone and the upper extremity of the femur. The total wearing away of the two extremities generally measures three or four centimetres and it may attain five or six centimetres or even more in some cases where the head and neck of the bone disappear almost entirely. Every year brings about a mean destruction of from 3 to 5 millimetres in each direction but the softening has a progress more or less rapid. The figures indicated here, have, of course, not an absolute value.

caverns on the surface of a bone, but this is rare; more often it produces tuberculous infiltration which **rarefies** and **softens**

(like **damped sugar**) the head of the femur and the roof of the acetabulum, or perhaps it is a question of a rarefying osteitis of the neighbouring parts, which is not tuberculous, but has been produced round a minute bacillary focus.

From the fact of this softening, the bones do not suddenly break down but are worn away gradually to a depth more or less great. The wearing away is produced especially if the child walks about, but it is also produced, although in a less degree, even in children who are kept at rest.

There belong to this second form, as we have said :

1st. Cases of Hip-joint disease of the first variety, that is to say, cases of hip-joint disease which come on with spontaneous and very severe pains, or with a displacement of more than 20°.

2nd. All cases of hip-joint disease of the following forms (which are in reality only coxitis of the second form in a more advanced state), namely, cases which have suppurated or are fistulous, and those of the dry carious form. The progress of the lesions and the progressive wearing away of tissue in the second form may be represented schematically by the figure opposite (v. fig. 353).

Without reckoning the examples of extreme destruction which fortunately are exceptional, one may say — and this is what I wish you to remember — that at this present time and *in more than three quarters of the cases of hip-joint disease cured, we observe a general wearing away of from 3 to 4 centimetres.* There is in this evolution of osseous tuberculosis something special to the hip-joint, and which we have not found in white swelling of the knee, nor of the in-step, where the bones do not decay and always preserve their outline. We ought to add that this wearing away of bone is seen especially in the hip disease of children. In the adolescent who has completed his growth, the bone will resist much better, and sometimes completely, the wearing and destructive process.

You will see later on (p. 385 and following) that the only means truly efficacious of altering this evolution of the tuber-

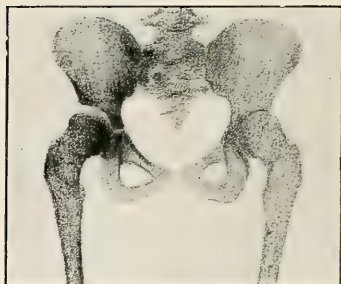


Fig. 354. — Right hip disease at the beginning; marked rarefaction of the osseous tissue, which appears lighter on the affected side. The articular interline is much less distinct.

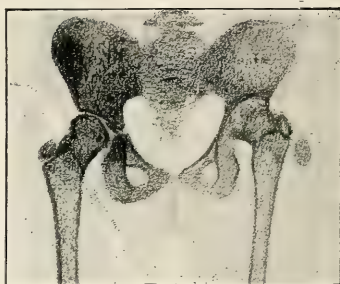


Fig. 355. — A more advanced type. Right hip disease; notable wasting of the head and neck of femur, and of roof of acetabulum. Moreover, outside the trochanter, there is a dark patch, which was found on clinical examination to be a small abscess.



Fig. 356. — Left hip disease; Rad. n° 1. The superior edge of the acetabulum is eroded as if scratched with the nail; in the eroded space are seen two small sequestra. The epiphysal body is cut in two by a gap which runs from the cartilage to the interline.



Fig. 357. — The same patient at the end of a year, after an abscess had appeared.

The acetabulum is very much broken down, its superior border raised; the whole of the epiphysis of the head has disappeared.



Fig. 358. — Old hip disease of left side with abscess. Considerable enlargement of acetabulum by complete wearing away of middle portion of iliac bone. From this destruction a kind of shrinking and telescoping of all the left half of pelvis has resulted.

The head and two-thirds of the neck of the femur have disappeared.

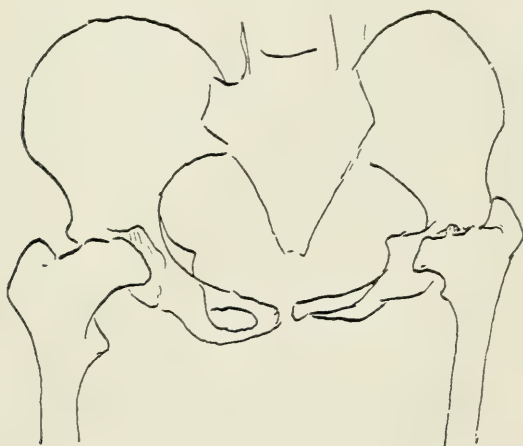


Fig. 359. — Double Hip disease without appreciable abscess (dry caries).

On the right. — The head of the femur and the upper half of the neck no longer exist. The middle part of the iliac bone, very much softened, has given way, causing considerable deformity of the pelvis.

On the left. — Disappearance of the head of the femur and enlargement of the cotyloid cavity.

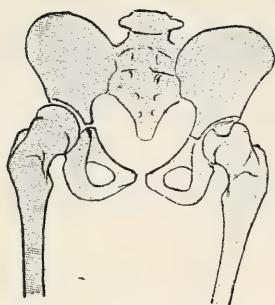


Fig. 360. — Another case on the right side. Erosion of upper part of head of femur.

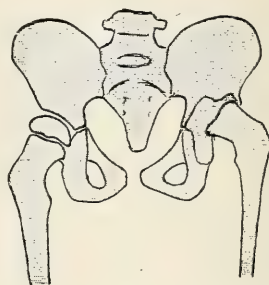


Fig. 361. — Right hip disease without abscess (dry caries). Complete necrosis of femur and considerable enlargement of acetabulum.

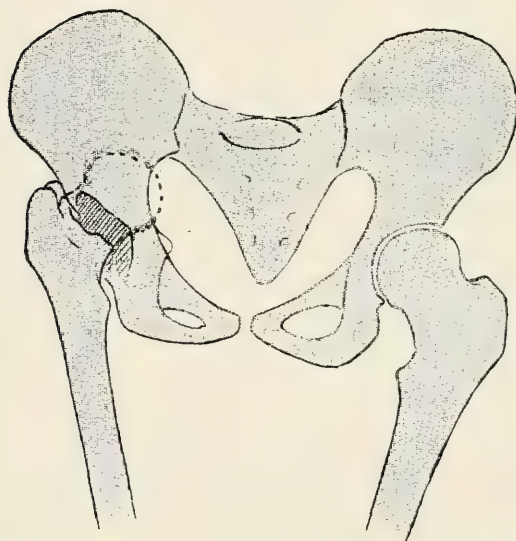


Fig. 362. — Pseudo-luxation. Necrosis nearly complete of the head and neck, the normal limits of which are marked by dotted line in the figure. There remains only a small stump formed by the infero-external part of the neck.



Fig. 363. — Another type more advanced; complete necrosis of the head and neck. Of the latter there remains only a small process in the form of a spine which is still in the cavity. Fibrous ankylosis.

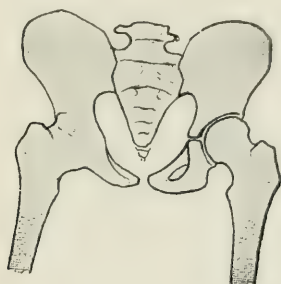


Fig. 364. — Right coxitis. — Type of osseous ankylosis in abducted position (osseous ankylosis is rare in hip disease).



Fig. 365. — True luxation. The head of the femur, or rather the small stump which remains of it, is completely outside the cotyloid cavity (the femur is generally turned round in external rotation).

culous process in the hip and of preventing its destruction is to make articular injections, as soon as hip disease is recognised, that is to say, before the bones have been seriously softened.

The three preceding figures summarise for you all the lesions of hip disease. Those which follow are radiograms in some way illustrative of fig. 353.

TREATMENT OF HIP JOINT DISEASE

The treatment varies with each variety of coxitis. — All the varieties may be considered with reference to the six following points : —

1. Without deformity. 2. Deformity. 3. Abscess. 4. Fistula. 5. Dry coxitis, which may be protracted. 6. Coxitis which is cured with a defect (shortening, ankylosis, luxation¹).

We will first define and illustrate in Part I the different varieties, and shew you the treatment suitable for each of them. In Part II we will describe in detail how the treatment must be carried out, that is, how to apply the technique. We will not describe the **general treatment** of tuberculosis. That you know : life in the open air, in the country or by the sea, for two or three years at least, if possible; good feeding; the use of medicines recognised to be good for tuberculosis, etc.

I. — 1st PART. CLINICAL. — THE SIX VARIETIES AND THE THERAPEUTIC INDICATIONS IN EACH OF THEM.

1st. VARIETY. — HIP DISEASE WITHOUT DEFORMITY

Hip disease at the beginning, without deformity and without spontaneous pain (fig. 351 and 352. p. 365). (Or with very little pain or deformity, for example, only from 10° to 20° of flexion or abduction).

For all these patients, you will prescribe **rest in the recumbent position** for eight or ten months at least.

You should never allow a patient with hip disease to walk.

Patients must not be allowed to walk save alone those of

1. We will describe later on double hip disease, coxitis with Pott's disease, etc.

the working class who are not able to be carried each day out of doors, and for whom keeping at rest would mean therefore condemning them to moulder away in some hovel. In these cases only, you would make a plaster apparatus down to the malleoli, and allow walking, but with crutches and a high sole under the sound foot, in order that the foot of the affected side does not touch the ground,

For all other children, rest in the recumbent position is infinitely better than walking, and you will order rest if you have entire liberty of action. However, if the parents *insist* on their child being allowed to walk, you may consent, provided he wears a plaster (in many countries, nearly all practitioners readily agree to this and treat their patients in this way); but you would not consent to it *without having freed your conscience* and informed the parents that in walking, whatever apparatus be chosen, with or without some arrangement for the so-called taking the weight off the trunk¹, with or without crutches, whether they put the feet to the ground or not, there is much less chance of causing cases of recent hip disease to abort (those of the first variety) and of obtaining the *restitutio ad integrum*: with walking, one will more often see produced an

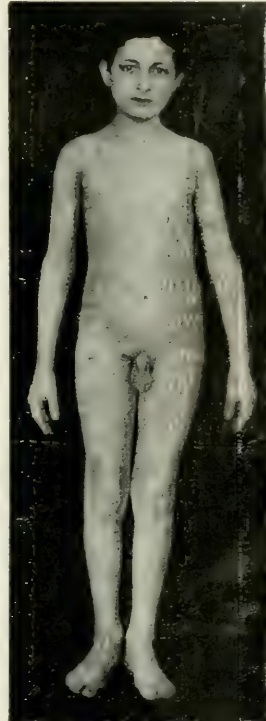


Fig. 366. — 1st case. — Left hip disease at the outset, without vicious attitude.

1. Lorenz and other surgeons after having much vaunted, for twenty years, the « appareils de décharge » approve of them no longer, having found fewer advantages than inconveniences, and actually prefer to them the « appareils de pression » of the two articular surfaces, that is, they make a simple plaster apparatus down to the knee, with which their hip cases walk on the sole of the foot, without even a high heel or crutches!

aggravation of the lesions and the formation of an abscess. And, if it should be one of the other varieties (second, third, fourth or fifth) you will tell the parents that with walking, or rather in spite of walking, one will end nearly always by curing them, it is true, but by taking much longer time and leaving the limbs much more shortened because, with the weight of the trunk upon the softened extremities of the bones — a weight which no apparatus could do away with — and with the shaking and knocks inevitable in walking, the lesions will progress more and will leave a wearing away and a loss of substance of the head of the femur and of the acetabulum, more extensive than if the child had not walked. You will leave the question of walking in the hands of the parents, and whatever is the result, it will be that which they deserve. Whenever you have to deal with reasonable parents, the child should be put to rest in the recumbent position.

The prescription of rest is not sufficient. For *hospital children* and those of the *working classes* you make a large plaster reaching from the umbilicus to the toes; your objective should be to cure rapidly and permanently without troubling here about movements¹.

For *town children*, well cared for by their parents, do not put on a plaster; keep them, **in mild cases**, at rest on the *frame with continuous extension*, which will efface the ugly deformity which may exist and will give a greater chance of preserving mobility than the plaster².

The functional result to look for in the first variety. — Thus, then, contrary to what holds good in Pott's disease, where we ought always to look for ankylosis of the affected bones (and where, consequently, plaster is always indicated) one ought, in the

1. Because, in these children « leave well alone ».

2. Would you do more and better? Would you make certain and hasten the cure, well! make in all these cases a series of modifying inter-articular injections as for a white swelling of the knee. It is a little more difficult in the hip than the knee. Nevertheless, willing practitioners may succeed by means of the technique given by us further on, p. 384.

first variety of hip disease, to look for the preservation of the articular movements, when that is feasible without compromising the cure..... that is to say, in children who are well looked after.

After Care. — The treatment once commenced, it will be sufficient for you to see the patient again once or twice a



Fig. 367. — Left coxitis, 2nd. variety. — Extreme abduction. Coxalgia extremely painful. The child has been anæsthetised; the redressment is about to be carried out.

month. You continue the treatment until the cure, which you may consider accomplished in from six to eight months after the disappearance of all pain, spontaneous or on pressure. At this moment, you get the child up, helping it, in the first exercises in walking, by means of a removable apparatus in celluloid (v. p. 474, *Convalescence*).

2ND VARIETY. HIP DISEASE WITH DEFORMITY.

Hip disease fully developed, accompanied with a marked deformity (of more than 20°).

Deformity occurs *either in abduction* (fig. 352) at the commencement, with **lengthening of the limb** and some pain; or, **later, in adduction** (fig. 368), with **shortening of the limb** and, most often, without pain.



Fig. 368. — Simple adduction (right hip disease).

Generally, adduction does not occur until after a period of abduction; this change of attitude may occur all at once, in one day, with some suffering; but, as a rule, it is produced little by little, in several days, and without suffering. In these cases of deformity, there is one treatment only to be adopted, in town or in hospital; *the redressment of the hip joint* — in several stages, if the parent object to anaesthesia — but better, with chloroform, at one or two sittings, each stage being followed by the application of a large plaster¹.

The Functional Result to be sought for in this second variety. — In the diseased hips of the second variety (and in the three following varieties), one abandons the idea of preserving movement. One should have for the objective the cure with a stiff hip-joint, but in a good position,

After Care, when corrected.

The apparatus is changed about every four months. — The removal of the plaster and the toilet of the child are performed in the way described for Pott's disease. Take the opportunity when making the change to examine the state of the diseased hip-joint.

Duration of rest (with the plaster). It will last until all

1. For the second variety, as for the first, I advise you to make intra-articular modifying injections before or after the redressment, but more often before (v. p. 384 about these injections).

pain has disappeared and even six or ten months from that time.

The child is then got up, but with an apparatus (plaster or celluloid) which he will wear day and night until he no longer has any tendency to a new deformity. But, such tendency still generally exists one and a half or two years after regaining the feet, that is, after the cure of the tuberculous process.

You must know that, in the second variety, very commonly (from the twelfth to the twentieth month) an articular or peri-articular abscess makes its appearance : the abscess of hip disease.

3rd. VARIETY. — HIP DISEASE WITH ABSCESS¹.

Abscess is produced in about half of the cases taken « en bloc ». It is more generally found in children who walk about and whose general condition is indifferent. The abscess does not show itself for nearly a year or two after the appreciable clinical commencement of the disease. It is announced

nearly always some weeks or several months before its appearance, by pains and night crying, occasionally by a slight evening rise of temperature of 37.6 to 38°. Very often it is not announced by anything appreciable, and you should now and then look systematically for it, by careful palpation of the



Fig. 369. — The abscess is indicated by a swelling limited to the outer region of the thigh, at a level with the upper third.

1. See figs. 369 and 370, also figs. 355 and 358, pp. 368 and 369.

entire region of the hip-joint. You should make this complete examination and systematic search for the abscess every month or two months, for example, in those not plastered; you will make it every three or four months in those who are, that is, simply at each change of the apparatus; this suffices well in practice, for an abscess always takes, at a minimum, several



Fig. 370. — Method of searching for an abscess; successive palpation of all the points with the two index fingers placed thus.

months to form, and, reckoning from that moment, still five or six months, at a minimum, before there is a risk of its opening.

The abscess may be produced in front or behind (in the buttock), outside or inside of the region, upwards, towards the crural arch, or downwards, towards the middle of the thigh, but especially at the upper third of it, in the antero-external region.

Finally, let us mention that the abscess is generally the index of a serious form of hip disease, in the sense that we must expect a shortening of about 3 cm. consequent upon the necrosis of the head of the femur and of the acetabulum, which

is produced in nearly every case of suppurated coxitis (v. p. 368 and 369). The softening and necrosis of the bones are less in the varieties without abscess. Not always, however; there are some dry forms of hip disease, to which we will return (v. p. 383), which bring about in the long run a necrosis as marked as the cases of hip disease with abscess (v. fig. 359); more than that, these dry caries may continue six, eight or ten years, while hip disease with abscess may be cured very quickly, in a few months from the day it reveals itself, provided that you treat it with punctures and injections. This is why it would be preferable for the patient to have an abscess, which hastens the cure. In some of those old dry caries we often wish that an accessible abscess would shew itself.

It is true that **formerly suppuration in the hip joint was much more serious** than a dry coxitis — because, then, one opened the abscesses and, by this open door, by this fistula, there penetrated into the tuberculous focus septic germs, carried in from without, which engendered fever, infection, visceral degeneration (of liver, kidneys, lungs), too frequently terminating, sooner or later, in death.

Therefore, for abscesses in hip disease as well as for that in Pott's disease, the first word as to treatment should be not to open an abscess, nor allow it to open itself. — The second, to treat it by punctures and injections.

We can summarise in a few words the line to follow in the presence of an abscess :

You must not interfere with it until it is easily accessible.

It is better to deal with it than to abstain from doing so, **if it is accessible**, which is nearly always the case.

It is a pressing duty, if the abscess is threatening the skin.

By interfering with it I mean, I repeat it, puncture, with injection afterwards.

4th. VARIETY. — HIP DISEASE WITH FISTULA

If every surgeon, in the presence of an abscess in hip disease, did his duty (in the way we prescribed) there would be no more fistula in hip disease. But there always will be, because.... *errare humanum est*.



Fig. 371. — Edouard R., England (Hospital Rothschild) admitted in July, 1900, with seven infected fistulæ and 40 degrees of continued evening fever. After two and a half years of persevering treatment, closure of all the fistulæ (without surgical operation), then redressment. Actually, now January, 1909, he walks very satisfactorily.

What is to be done in the presence of a fistula? We ought to repeat here what we have said of fistulæ in general, and of those in Pott's disease (Chap. III and Chap. V). We have seen the way to distinguish a non-infected fistula from an infected one, that is, with a *secondary* septic infection added to the bacillary field, but pure at the commencement. The discrimination of the two varieties of fistula is of much importance in prognosis and treatment.

a. Non-Infected Fistula.

Here, nothing is lost as yet, but it is necessary to hasten the closure of the fistula, because, in the long run, it will end by becoming infected (almost certainly).

One will make injections after the manner described on p. 174, through an opening made in the plaster.

In the **infected** fistulæ, the treatment is summarised in four words : asepsis, fresh air, overfeeding, and patience.

b. Infected Fistulæ.

Keep to the simple aseptic dressings as long as there is no fever (the absence of fever proves that the pus is discharging well).

When fever supervenes and persists for several days or several

weeks, one must interfere, for fever is the enemy. Its cause must be retention of pus, and it is necessary to find out where this retention is, and drain at one or several points. but drain **only** with no other desire than to bring about a fall of the temperature (fig. 371).

If the fever is overcome in this way by drainage, do not concern yourself about any operation with pretensions to radical cure. Above all, do not make a resection which « would carry off everything »... yes, even the patient himself; these great resections give a new impulse to the infection already existing and consequently do more harm than good.

Resection in Hip Disease.

So-called complete resection in hip disease is a bad operation; it cannot cure the tuberculous fistula; indeed, it very often aggravates it. More than that, it mutilates the patient — a patient who has been resected preserves (when he is cured?) a limb much less satisfactory than if he had been treated without resection.

It is **not** necessary to **perform resection** (incomplete) **except to perfect drainage**: that is the only indication and the only use of resection in hip disease. Believe me, the indication for this operation will perhaps never present itself to you, for, personally, I do not find it necessary to perform even one a year (on an average) out of several hundreds of cases of hip joint disease which I have under treatment.

Take particular notice of this indication. In certain cases the fever persists in spite of all the drainage provided; if the fever is not due to a general cause, it is due to infected pus being retained at the bottom of the acetabulum or in the pelvis above the perforated acetabulum, being kept there by the presence of the head of the femur, which it will be necessary for us to remove entirely or partially.

You will perform resection, not with the great idea of doing away instantly with all the lesions — that is impossible — but with the more modest intention of doing away with the

retention of pus and removing the infected sequestra which may be, of themselves, a cause of fever.

At what moment would you perform resection?

In such a case, one must know when to interfere — not too soon, but not too late.

Not too soon, that is, not before having tried all the other means to make the temperature fall: peri-articular drainage, and drainage below the crural arch, and, if that will not suffice, opening of the articulation or simple arthrotomy. For, resection ought to remain an operation of necessity, it must not be resorted to unless one is morally certain the temperature will not fall without it.

It is necessary, however, *not to intervene too late*: I will explain myself.

Fever is a danger vital to the patient, a danger soon fatal if it goes to from 39° to 40°, but less imminent if it oscillate about 38°. In these two cases, it leads to a visceral degeneration (albuminuria, fatty liver, enlargement of the spleen, etc.). If one interferes only when these are already produced with a certain intensity, these secondary visceral degenerations following septic absorption, one would not be able to « rescue » the patient, and the visceral lesions would from that time develop of their own accord.

It is better not to wait until there is albumen in the urine (the urine must be analysed every two or three days). Nevertheless, when there is only a trace of albumen, there is still time to interfere, but you must be quick.

It remains always well understood that the cause of the fever is to be found in the hip joint and not in a visceral complication, in which case an operation unavoidably incomplete would merely stimulate the visceral affection and the fever itself. In the course of the operation upon these infected patients you should use antiseptics but sparingly, on account of the kidneys. You prescribe a milk diet after the operation (and even before) to the same end.

If you are in the presence of a subject already profoundly

infected, with a slight tinge of jaundice, a notable quantity of albumen in the urine, and a liver projecting beyond the costal margin, that is, with all the signs of an infection which has already spread through the entire organism; in such a case, it is too late to operate; you would not cure your patient, you would have, in operating on him, every chance of sensibly hastening his death. Leave him to die in peace.

This leads me to repeat to you in the form of conclusion : A fistula in hip joint disease is infinitely more difficult to cure than to prevent.

To prevent it, do not open abscesses and do not allow them to open spontaneously; that is all.

Recall our aphorism : « **To open tuberculous abscesses (or to allow them to open) is to open a door through which death will too often enter** ».

5th. VARIETY. — HIP JOINT CASES WHICH GO ON INDEFINITELY

I wish to speak here of those **old hip cases decorated with the name of rheumatism**, and which never come to an end! — Coxitis without abscess, with pains occurring from time to time (due to a dry caries).

The patients can get about a little, they have almost returned to their accustomed life, but without ceasing to suffer unmistakably in the hip, and they find, from time to time, that their sufferings become so acute as to oblige them to give up walking and return to complete rest for several days or several weeks.

What is one to do with these cases of dry coxitis, which linger on for six years, eight years, ten years, twelve years? One ought to long for the formation of an abscess, as we have mentioned on p. 379.

One would puncture that abscess and one would be rid of it with a few months of treatment; whilst without an abscess the disease might be protracted for years... But an abscess will not come! (This it not so absolute, however — it may come when we are no longer expecting it).

Here are the three alternatives between which you must choose
Either make injections, or wait, or resect.

1st. Injections? Yes, but it is particularly difficult to reach all the points of a hip joint affected for so long a time, where the surfaces are adherent, partly or entirely.

Try to, however. I have cured some such patients.

If the injections cannot give you, in this case, a rapid cure, they will not be without some advantage.

2nd. Wait? Yes; if the injections have not succeeded, wait — placing the patient at rest, at least at relative rest, not allowing any walking without a plaster or celluloid apparatus, making nocturnal extension, etc., and resuming the injections once or twice a year,

3rd. Resect? There are no indications sufficiently pressing to lead to this operation, which allows, by whoever it may be done, so many chances of leaving a fistula, consequently an aggravation instead of an amelioration of the patient's condition. A fistula! Think now, if it became infected, it might lead to death, whilst the actual pain of the disease does not, after all, prevent the patient leading an almost normal existence. Resection can be contemplated only if you are a very capable surgeon, full of confidence, and if the patient, quite aware as to what may happen, nevertheless begs you to bring the matter to an end.

And even then, make him wait, induce him to reflect upon it for six months or a year longer, before you carry it out. If he continue to insist, you may operate on him, but I think this obligation will not occur to you once in twenty times. If you resect, endeavour to obtain, by every means, union by first intention.

THE METHOD OF MAKING INJECTIONS IN HIP DISEASE

The necessity for injections.

Before going further, I will explain myself thereupon. When you have read in the following chapter (Treatment of White Swel-

lings) that injections are the regular treatment of these arthritides (where they give the same good results as in cold abscesses) you will ask why I have not immediately recommended this means as the invariable treatment in coxitis, which is only, in fact, a white swelling of the coxo femoral joint.

Simply because this method is more difficult of application to the hip than to the other joints. The articulation does not lend itself to it, anatomically, as the knee for example. It is more deeply placed, the cavity is less accessible to the needle. I do not speak only of the space between the articular surfaces which are fitted together too closely for the needle to be able to penetrate easily the interline, but also of the synovial culs-de-sac, where it is difficult to introduce the injection with certainty.

The difficulty is especially great in rather old cases of hip disease where the cavity is obliterated by adhesions, or at least very much obscured by bands of membrane.

That is why injections are not yet admitted into the current practice in hip joint disease. But how we ought to regret it, and what great benefit they would bring with them! I do not hesitate to say that it is only with the injections that we are able to alter the prognosis of coxitis, still so grave from the orthopædic point of view, when other treatments are applied.

And if hip disease no longer kills — or, at least very rarely — since practitioners no longer open the abscesses, it still leaves far too much shortening and lameness, in spite of the best fitting apparatus, in spite of the correction of deformities. This is due to the fact that tuberculosis rarefies, softens the articular surfaces of the hip joint, the head of the femur and the roof of the acetabulum, and consequently paves the way to the destruction and shortening which supervene, sooner or later, after one or several years. See under the figures on p. 371 the extent to which this wasting and destruction of osseous tissue goes.

But this is not an isolated fact — it is so in more than 3/4

of the cases taken *en bloc* : 1st, in all those accompanied with abscess, which represent already half of the cases of hip disease, and 2nd, in the case of nearly all dry forms which continue beyond one or two years. That is what occurs nowadays, in spite of rest, immobilisation, general treatment, etc.

If practitioners are not willing to do more, they must be resigned to see more than three-quarters of their cases of hip disease doomed to a permanent shortening of from 3 to 4 cm.



Fig. 372. — Madeleine J. — Radiogram on arrival.

on an average ; and you know that such a shortening cannot exist without an appreciable lameness.

What must be done is to seek for and find the means of preventing this, or better still of preventing the softening and wasting produced by the tuberculous fungus ; the means of destroying it before it has « eaten away » the head of the femur and the roof of the acetabulum. Does **the means of destroying the fungus** or of altering it's development exist ? Yes, there is one, but only one ; it is to carry a *modifying liquid* right up to it. **The proof has been made** in the fungosities of cold abscesses and other white swellings, which do not differ obviously from the fungosities of hip disease.

Seeing that in the disease at its commencement (autopsies of



Fig. 373. — The same patient after six months. Radiogram taken at the time the injections were commenced.



Fig. 374. — The same patient a year after the injections. No other trace of the disease remains except a loss of osseous substance on a level with the superior and internal angle of the neck. — Complete cure with all the movements intact.

cases of early hip disease prove it) the lesions are always localised

in the synovial membrane and on the articular surface of the bones, we shall be able by early intra-articular injection to attack the fungosities before they have destroyed the bone.

Here, moreover, is a commentary on tuberculosis of the hip joint which is very instructive in this respect :

Madeleine J., seven years old (from Paris), sent by my very distinguished colleague, Dr Cuneo, arriving at Berck in September, 1903. The radiogram (fig. 372) shews that the tuberculosis has destroyed a good third of the neck of the femur and that there is a sequestrum at that point. This sequestrum it had been proposed to resect by a surgeon who affirmed the impossibility of cure without operation; but the parents refused their consent.

As for me, I did not believe in the necessity of a resection for the cure of the child; but I feared complete destruction of the neck after a short time by the progress of the tuberculosis, which appeared very virulent; it was excessively painful, which led me to propose modifying injections, to which the family, unfortunately, objected. Half a year passed; the child was not better. I insisted again with the parents, telling them that, if they refused, we should very probably see in a few months, the neck destroyed entirely, the head separated from the diaphysis, and that grave and irremediable infirmity would result. M. Cuneo on his part insisted and succeeded this time in convincing the parents.

Our fears were only too deeply realised. A radiogram taken at the time we commenced the injections (fig. 373) showed plainly that the tuberculosis had destroyed nearly a third of the neck since the first examination and the first radiogram, — and that, in spite of rest, in spite of the plaster and the air of Berck.

I made a series of injections of camphorated naphthol after the manner described on p. 166. I softened the fungosities and obtained an appreciable collection of pus at the sixth injection. From that time I made punctures and injections to the extent of ten punctures and ten injections according to my usual technique for the treatment of tuberculous abscesses (see chap. III).

A strange thing which shewed that we had reached the affected part of the bone was that through the puncture needle, small osseous granules, debris of sequestra easily recognisable, repeatedly passed out. After this series of injections, which lasted seven weeks, compression was made for three months. A year later, we took a new radiogram (fig. 374); not only had the destruction of the neck not progressed, but the neck, on the contrary was slightly repaired and the cavern which had appeared was partly filled up. More than that, the sequestrum had disappeared. The patient was cured. The neck has ever since then become stronger. We saw the child three years later; she had become perfectly cured without any shortening, without functional damage. Think of the infirmity she would have had to live through if we had not made the injections, or if we had waited longer!

This proves, and we have plenty of other cases to the point which also prove (fig. 375, 376), that our injections are able to destroy the fungosities and to preserve the bones of the hip joint from rarefaction and eventually destruction.

You see now why I advise you to make intra-articular injections at the outset, in all cases of hip disease, as one constantly does for white swelling of the knee? And the treatment will be even more necessary in the hip joint, where the bones, as experience shews, resist infinitely less well than those of the knee, the destructive action of the tuberculosis.

II. — Indications for early intra-articular Injections.

Because we have spoken of making them in *all* cases of hip disease, we do not wish to say that there are not cases of hip disease essentially benign, where, the lesions having been only synovial and the bones hardly touched by the tuberculosis, there will certainly ensue an important osseous destruction if injection is not carried out.

No, there are some fortunate exceptions already pointed out; but how are we to know which are the cases which may

be cured in this way without subsequent destruction? There is no absolute criterion.

There are probably cases of hip disease which come without

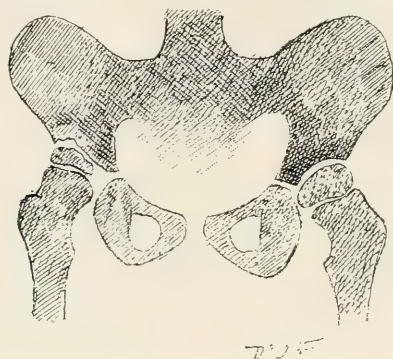


Fig. 375. — Germaine G., five years of age; left hip disease before injection. The joint was threatened with complete and early destruction.

spontaneous pains or deformities, and in which there is not, as shown by the X rays, breaking down nor even appreciable

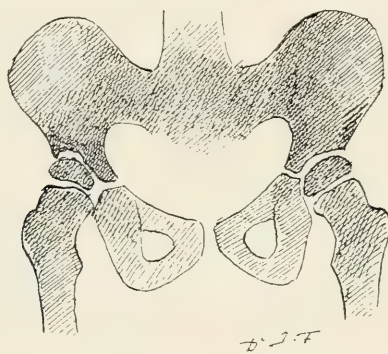


Fig. 376. — The same, eighteen months after injection. One can see that, thanks to the injections, wasting has not progressed. The tuberculosis has been averted.

rarefaction of the bones, cases of hip disease which have been, on the other hand, taken care of from the outset. Yes, without doubt; but remember, however, that there is nothing certain from this point of view, that nothing can give us precise assu-

rance that, while we are keeping back our injections, the tuberculous process is not secretly and silently rarefying and softening the extremities of the bones.

Consequently, even in these cases, and because of the too



Fig. 377. — Radiogram during life after the introduction of the needle; the point is in the interspace. This proves that one can penetrate there, but it is uncertain and difficult.

numerous uncertainties which we have against us, we must **make injections** : that is, generally speaking, **in all cases**.

III. — When must the injections be made ?

We say, at the very **beginning** : as soon as the diagnosis is established.

To wait until there is an abscess, or to interfere only when the coxitis has lasted one or two years, **is a mistake**, because then it is too late.

In fact, in all hip disease lasting for one or two years the rarefaction of the bones is already too marked, nearly always, for you to be able to save them from wasting. When the hip disease appears before the abscess, with a noticeable deformity of more than 20° , or with severe pains, it may mean we are too late, not always, nor even frequently, but in some cases.

The principle is to make injections before the bones are — I do not say destroyed — but simply softened.

Does this mean that no injections must be made in cases of hip disease which are already old? No, they must be made because, with injections, if one is not able completely to prevent destruction (the bone being already too much softened and rarefied), one may still limit it somewhat, since it takes three, four, and five years, and more, to arrive at the full extent of the mischief. (In four cases of old hip disease of two and three years standing, I have been able to save, almost entirely, the osseous extremities which, as shewn in the radiograms, had, on the arrival of the patient, seemed doomed to complete destruction).

IV.—The Technique of Intra-Articular Injections of the Hip Joint

First, you will carry out the treatment in the same way as for white swellings. You will find in the following chapter

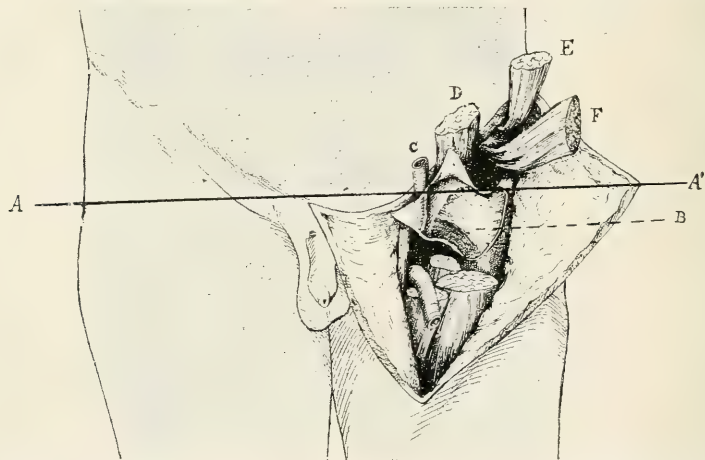


Fig. 378. — Dissection of the inguinal region to shew the **accessible zone** of the synovial cavity; this zone **extends over the whole anterior surface of the neck**. — AA', horizontal line passing through the pubic spine; — B, anterior surface of the neck; — C, femoral artery; — D, Psoas; — E, Sartorius; — F, Rectus (B, is the **point of election for puncture**).

(p. 397) all about the instruments required, the liquids, the number of injections, their intervals, and you ought to *read the entire chapter before making injections into the hip joint.*

V. — The Points of Access to the Hip-Joint.

To penetrate into the cavity, the point of election is found *in front*.

Explore the sound hip joint; you will be able to feel below the crural arch, between the sartorius and the artery, the head of the femur rolling under your finger when you impart movements of rotation to the knee (see fig. 377 and following).

In front, the cartilaginous part of the head is directly perceptible (that is, the part outside the acetabulum) to a height



Fig. 379. — Radiogram during life in one of our cases of hip disease, after the injection of iodoformed oil into the synovial cavity; one can distinguish the shadow of the capsule distended with the liquid. This is the proof that you have penetrated into the joint cavity.

of 1 1/2 cm. in a child 2 1/2 cm. in an adult, and we must allow for, in addition, the cul-de-sac formed above this point by the synovial sac. This zone is as broad as it is high. We

have there, consequently, an area quite sufficient for the injections.

To reach the cavity in this zone, we have only to pass through the skin and the thin muscular lamina of the *psaos* and *iliacus*. It is easy to avoid the vessels (artery and vein) which

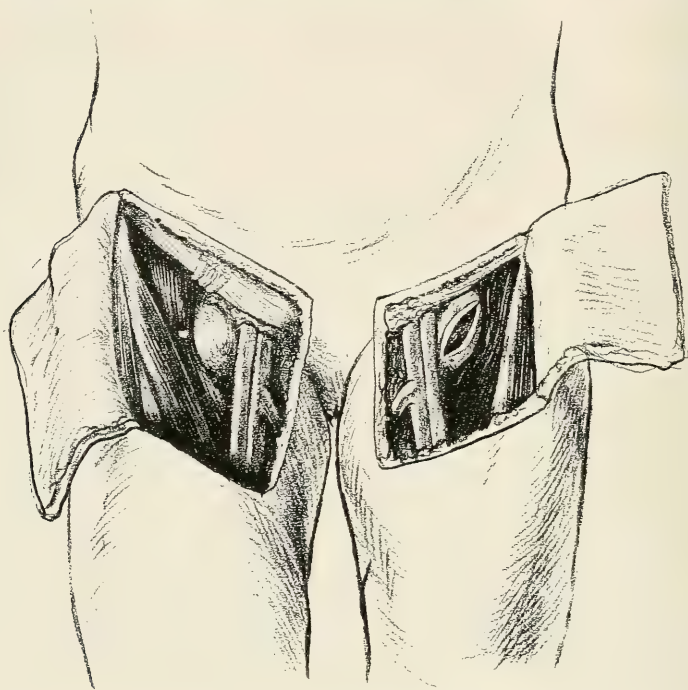


Fig. 379 *bis*. — Diagram drawn from nature in the course of a dissection, after an injection with methylene blue of the two hip joints. — On the right side is seen the capsula distended with liquid, between the vessel and the *psaos* and *iliacus*. On the left, the capsule has been incised, the head of the femur is shewn, coloured blue.

are well out of the way on the inner side, as shewn in fig. 378,

As to the anterior crural nerve, it is nearer. Still, it can be avoided quite as easily, because it is in close relation with the artery, and besides, pricking the nerve would not have very serious consequences.

But it is necessary to enter into some details.

We have made more than one hundred experiments on the cadaver (injections, followed by control dissections) and numerous radiograms *during life*, of our cases of hip disease, after injections with iodoform (v. fig. 379), to establish in a precise way the technique of the injections. Here are the practical conclusions drawn from our enquiries.

You ought not to make injections into the articular interline — which is not impossible (v. fig. 377) although it is difficult to reach. Neither must you make them on a level with the cartilaginous part of the head, because the capsule being at this level in close contact with the bone, the liquid would only penetrate into the interstice with great difficulty. **You will make the injections into the inferior synovial cul-de-sac at the level of the anterior surface of the neck;** this cul-de-sac possesses a certain laxity which renders the penetration of the liquid relatively easy.

Here are the points fixed upon. In a child of ten years, you puncture at a point indicated by a small cross in fig. 381. *at 1 cm. below the horizontal line passing through the pubic spine and at 1 $\frac{1}{2}$ cm. outside the femoral artery* (which can be felt pulsating). In an adult allow respectively 1 $\frac{1}{2}$ and 2 cm. (fig. 380 and 381).

Puncture directly from front to back. The needle should be pushed in to a depth of from 3 to 4 cm. in a child, and from 5 to 6 cm. in an adult of medium stoutness. In a word, push it in until it is stopped by the osseous plane (the anterior surface of the neck) the resistance of which is characteristic. You will always be stopped by the bone, if you puncture at the right place.

One may succeed by leaving the thigh in the extended position. But the penetration of the liquid is facilitated considerably, as M. Farabeuf has pointed out, by placing the limb in the position of flexion at from 25° to 30°, with abduction and external rotation of from 15° to 20° (fig. 383).

You understand then, that by this slight flexion of the thigh, *always possible at the outset of hip disease*, the anterior

part of the capsule relaxes (as the fingers of a glove are relaxed by flexion of the hand), detaches itself from the bone and comes of its own accord under the point of the needle, which penetrates it easily (v. fig. 384 and 385).

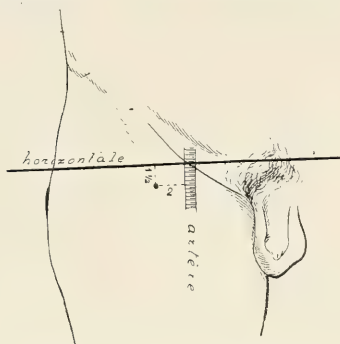


Fig. 380. — In an adult, puncture 1 1/2 cm. below the horizontal line passing through the pubic spine, and at 2 cm. outside the artery.

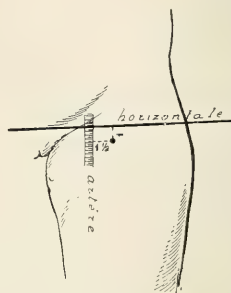


Fig. 381. — In a child of from 9 to 10 years of age, at 1 cm. below the horizontal line and at 1 1/2 cm. outside the artery.

The injection being pushed home, place a tampon over the puncture and lay the thigh gently down. Then apply a light, compressive dressing.

VI. — Conclusion.

We will now give the scheme of treatment which you ought to follow in all cases of recent hip disease.

The diagnosis being established, you place your patient at rest, in continuous extension or in a plaster, according as the case is that of a town child or a hospital child.

If you employ the plaster apparatus, construct it bivalve (fig. 386) in such a way as to be able to remove it easily at each injection, so as to give to the thigh, each time, the slight flexion desired (fig. 383).

You commence the injections after two or three days rest.

You inject, as we have said, the same fluids, in the same doses and at the same intervals as if you were treating a white

swelling of the knee, or an ordinary cold abscess (v. Chap. III). Use a needle (N° 2) **bevelled short**, like the needle used for injection of cocaine in the spine and inject oil, creosote and

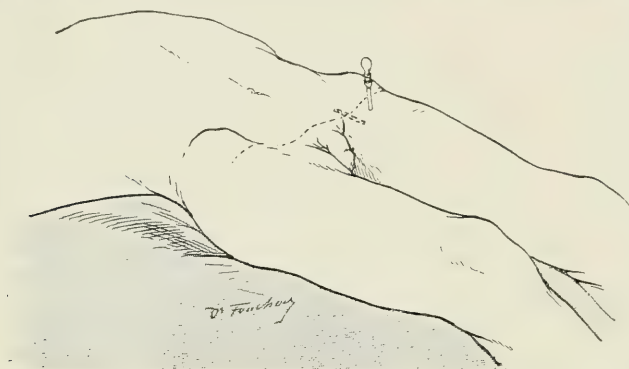


Fig. 382. — Fixed points traced with dermographic chalk; the thigh extended, puncture and penetrate until you feel the bone.

iodoform (4 to 10 grammes), rather than naphtol, camphor and glycerine.

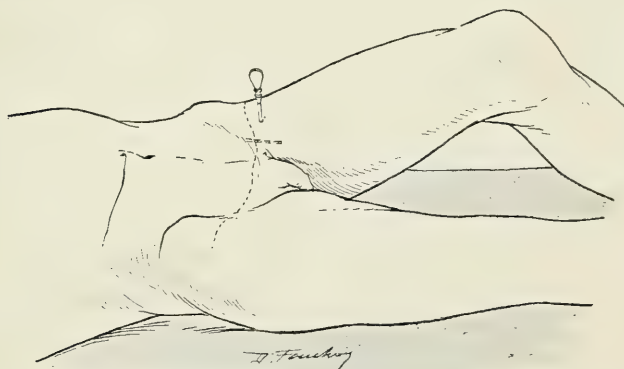


Fig. 383. — The femur is afterwards put in flexion at about 30°; while this movement is made, see that the point of the trocar does not leave its contact with the bone.

The nine or ten necessary injections take you two months, after which, for three months, you make pressure with cotton

wool over the articular region (always together with continuous extension or the plaster).

This period having passed, discontinue the plaster, but you

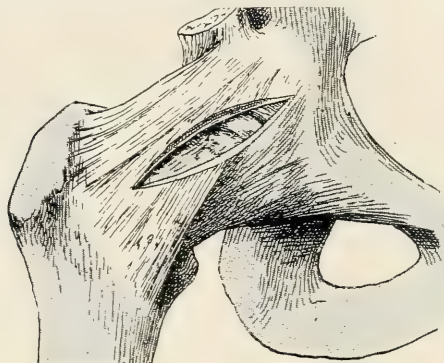


Fig. 384. — The incision allows one to see that, in the position of extension of the thigh, the capsule is flattened over the head and neck.

must wait four or five months before allowing the patient to get about. Then he is cured¹.

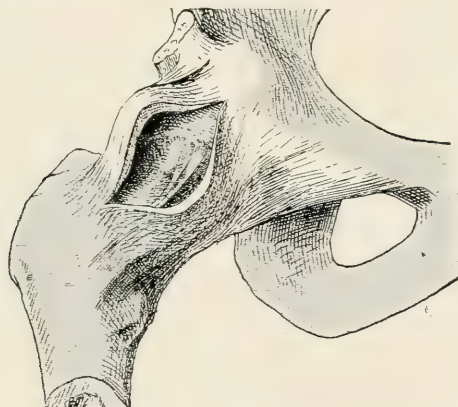


Fig. 385. — In flexing the thigh, the margins of the incision gape widely, allowing the space which exists between the capsule and the bone to be seen.

1. If this is not so, that is, if pain continues four months after the injections are stopped, which may sometimes happen here as in the other cases of white swellings, you would make a second series of injections. (Consult the note on page 499).

So that the cure will be obtained in ten months from the commencement of the treatment (10 to 12 months), instead of the three or four years ?] required by the ordinary treatment without injections.

With the injections, the duration of hip joint disease will thus be reduced by two thirds; but, above all, cure

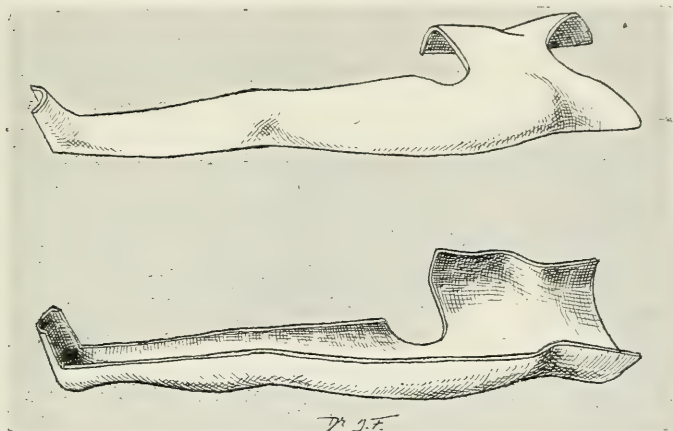


Fig. 386. — Bivalve plaster held together by bandages or by hooks and eyes (v. p. 156).

without shortening and without lameness — **complete cure** — will be **the rule**, while **with all other treatments** this result would be quite **exceptional**.

Thus the history of the treatment might be written in three lines : —

1st period, that where *one used to open the abscess* : the patients died of hip joint disease.

2nd period, that where *one punctured the abscess* : the result was the cure of the hip disease, but at the price of an infirmity.

3rd period, that of **early intra-articular injections** : the hip disease is cured, cured quickly, without lameness and without defect of any kind (see *Journal des Practiciens*, 14 march 1908; *Traitement de la Coxalgie*, conférence faite à l'hôpital Beaujon [service du professeur Robin], par F. Calot).

**6th VARIETY. HIP JOINT CASES « CURED », BUT WITH A DEFECT.
(SHORTENING, ANKYLOSIS, LUXATION).**

I wish to speak here of those cases of hip joint disease cured, or apparently cured for one or several years, which come to you, or come back to you, for some functional defect (fig. 387 and 389).



Fig. 387. — Vicious ankylosis; flexion, adduction and internal rotation.

The parents complain that the child is more or less lame, that the limb is shortened and is still becoming shorter, that the back is deformed, at the same time that the loins are becoming hollow; or simply that the hip is stiff, which causes a difficulty in sitting down and in putting on the shoes.

They come to ask you if it is possible to efface these functional defects or at least to prevent them becoming worse.

Your reply should be prompted by the two following principles :

1st. If there is **simply stiffness of the hip, nothing must be done.**

2nd. If there is lameness and shortening, or dorsal deformity, one can and one ought to **obliterate as much of this lameness and shortening as is caused by the deformity of the hip joint.**



Fig. 388. Vicious ankylosis; hollowing very marked.

The deformity removed, do not look for mobility, but endeavour to produce an ankylosis in a good position.

I will explain myself on the two rules I have just laid down.

1st. You will not interfere in order to « loosen » the hip joint.

In fact, it is either a question of hip disease without shortening — (see further back, the hip diseases of the first variety) — and then you will not touch it, in virtue of the *primo non nocere*; for, not only would you not have more than one chance in ten of re-establishing the movements, but you would run too great a risk, in interfering, of **aggravating** the patient's condition.

Or it is a question of hip disease with shortening — (see further back, hip diseases of the second, third, fourth varieties) — and then it would be rendering a very poor service to the patient to do away with the stiffness of his hip joint (admitting that it were possible to succeed in this without danger to him).

As a matter of fact, these patients would not walk so well afterwards as before. It is to their interest to have the hip stiff; this is so true that you must, in the case of persons with hip disease in whom the joint is moveable and there is marked lameness, endeavour to stiffen the joint in order to lessen the lameness (which can be done by wearing an immoveable apparatus over a long period).

2nd. Principle : in lameness due to shortening, one will do away with the amount of it caused by the deformity. But what is this amount? That is what we are going to determine.

A. — Shortening. Its Causes or Factors

Very marked shortenings are due to two principal factors :

1. *A deformity of the hip joint.*
2. *Wearing away of the extremities of the diseased bones and atrophy of the skeleton of the whole limb.*

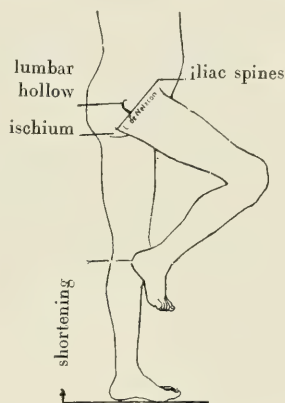


Fig. 389. — In order to learn the exact functional shortening, one ought to efface the lumbar hollow and place the two iliac spines on the same level; this, one does with the patient upright. The shortening is equal to the difference of level of the two heels.

Against the first factor of shortening we can do much.

Against the second we can do nothing¹. We can only hide it by causing a high heeled boot to be worn.

Method of ascertaining the total shortening and the amount of it due to the deformity (fig. 389 to 396).

In order to bring the foot of the affected leg as near as possible to the other, the patient hollows and deforms his back.



Fig. 390. — Here the shortening is measured with the patient lying down. To make the hollow disappear one has been obliged to give to the knee this marked degree of flexion. The total shortening is equal to the distance which separates the heels.

By this artifice, he will have less apparent shortening



Fig. 391. — An unlikely deformity. The patient walks by supporting himself on his hands. The shortening equals the distance between the heels and even more, for one can see that the hollowing is not entirely done away with and that one would have, in order to obliterate it, to raise the knee still more.

and perhaps less lameness; but he will have in addition an

1. Except as preventive, by injections (v. p. 384).

unsightly dorsal deformity, which will not be any better than a degree more of lameness, especially in the case of a young girl.

To demonstrate the real shortening, the total shortening

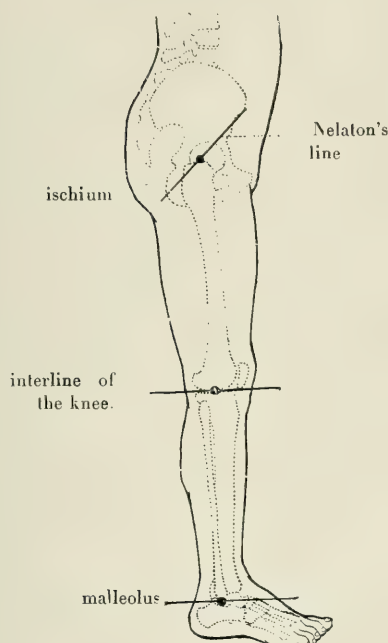


Fig. 392. — Measurement of the limb. — Measure from the centre of Nelaton's line to the external margin of the sole of the foot (passing by the point of the external malleolus).

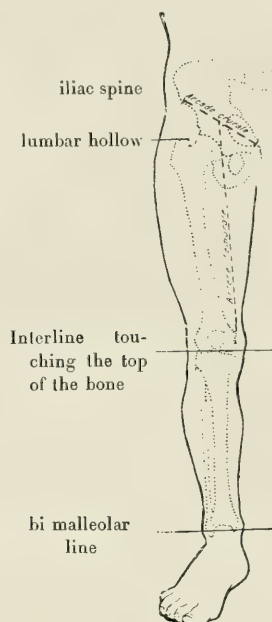


Fig. 393. — Measurement of the front. (Compare the measurements obtained from the two limbs).

of the lower limb, you ought **to begin by placing the back quite straight** and, in order to do so, you proceed to flex and carry inwards the affected thigh until the lumbar hollow is effaced, until the " loins " touch the table and until the two iliac spines are at the same level (at the same perpendicular to the median axis of the body). This done, you bring the affected heel against the sound calf, and measure from the point of

contact to the sound heel (see fig. 390 and 391); this distance gives you the total shortening¹.

What is the share of each of the two factors : **deviation** and **wearing away**?

It is easy to calculate.

Measure the length of the affected limb starting from the centre of Nelaton's line (I say from Nelaton's line and not from the upper border of the displaced trochanter); measure from

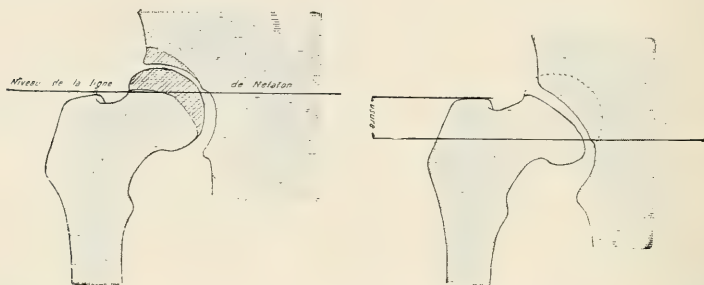


Fig. 394-395. — Method of measuring the share which is due to wasting of the bone ; — the wasting is equal to the distance which separates the two horizontals (trochanter and centre of Nelaton's line).

this line down to the external border of the sole of the foot (fig. 392). Take the same measurement on the sound side, from Nelaton's line to the sole of the foot.

Compare the measurements of the two sides.

a. Wearing away of the skeleton. The difference between the two sides represents the share of the factor which comprises the wasting of the articular extremities and the atrophy of the skeleton of the whole limb. The wasting of the

1. Measured thus, one sometimes calls the shortening functional, in contradistinction to the real shortening which should be "the loss of substance" of the bones in their length; this distinction is an error, or at least demands an explanation; the functional shortening which is, for example, of 15 cm., is the real shortening, in the sense that the patient is *really as lame* as if he had a shortening of 15 cm., and if one does not remedy it, the patient will remain shortened all his life just as if he had *really lost* 15 cm. of the length of his limb.

extremities alone is equal to the distance from the superior border of the trochanter above the centre of Nelaton's line (v. fig. 394, 395).

b. Deformity. — The *remainder* of the total shortening will be *the share of the deformity*.

Let us suppose the total shortening to be 15 cm. (which it frequently is) and that you have found, on measurement in the way we have mentioned, a difference of 3 cm. between the two



Fig. 396. — Estimation of wearing away and atrophy in the length of the bones. The small horse-shoe indicates the outline of the trochanter; the distance from the trochanter to Nelaton's line indicates the wasting. From the trochanter to the point of the patella (interline of the knee-joint) and from that interline to the external malleolus, one has the measure of the length of the bones; compare with the sound side (the same fixed points).

lower limbs. To the deviation will belong in this case, 15 cm. less 3, that is 12 cm.

You will be able to promise the parents that you will do away with the 12 cm. — that is, four-fifths of the shortening — by your treatment.

Instead of actually 15 cm., you will tell them that the child will not have more than 3 cm. of shortening. And with only 3 cm. and with a hip joint solidly fixed in good position, he will not be noticeably lame.

The Reason for Interfering with Shortening.

In what case would it be well to interfere? — At what moment? and how?

Ist. We have said that much can be done against deformity.

Is this a sufficient reason for submitting the child to an interference every time there is a deformity? *No. Unless the result is worth it.* So I advise you to do nothing, or to use only slight means — traction at night time, weights on the buttocks, etc. (see fig. 850 and 855), in those cases where there is less than 4 or 5 cm. attributable to the deformity, and if, moreover, this deformity is not increasing. To make sure of it, take the exact measurements every three or six months.

On the other hand, it would be necessary to interfere each time that at least 5 to 6 cm. are due to deviation, especially if this were increasing. And it happens very frequently that deviation is responsible for more than 5 or 6 and even 10 cm. and that it has a certain tendency to increase.

How to interfere, that is, **by what procedure?** That will depend on the degree of stiffness of the hip joint and the variety of the ankylosis — *complete*, osseous; or *incomplete*, fibrous.

Direct examination, in revealing to you very distinct movements, enables you to make a diagnosis easily in the great number of cases.

In doubtful cases, when you do not perceive distinct movement in the femur (after having fixed the pelvis) have recourse to X rays, which will shew you a continuity between the two bones. In default of radiography, administer a few drops of chloroform to make a rapid examination of the hip, and make certain whether there is movement or not. I can assure you that you will **nearly always** find, in true coxitis, **a few movements**, even in the cases labelled “complete ankylosis of the hip-joint”.

B. — Ankylosis in Hip Joint Disease

1st. Case (frequent). — *Incomplete ankylosis.*

You have perceived (with or without chloroform) very distinct movement; you will make a simple redressment (without tenotomy if you are not a surgeon — with or without tenotomy if you are a surgeon).

2nd. Case (rare). — *Complete ankylosis.*

There are **no distinct movements**, even under chloroform; do not persist, for, in persisting for 10 minutes, you might provoke them very often, because you may happen to separate the two welded articular extremities; you may cause also a great traumatism; do not do it; it would be better to consider it clinically as one of those cases of complete ankylosis, where there is not immediately, under chloroform, any appreciable movement.

For such cases, you will perform a supra-trochanteric **osteotomy** (**linear** and **sub - cutaneous**) or an inter-trochanteric, to be further away from the old focus.

I do not wish to leave you ignorant of the fact that surgeons prefer osteotomy, even for incomplete ankylosis, to simple redressment, because, say they, redressment, by disturbing the seat of the old tuberculous focus, is sure to predispose to a revival of the tuberculosis much more than osteotomy, which acts on a point far removed from the focus.

This objection has scarcely more than a theoretical value, especially if one does not carry out the redressment until the tuberculosis is quite cured and the patient's general condition is good; it might be necessary to wait for one or two years on that account. With a redressment done at this moment, methodically, in two stages if you like, you would not run any more appreciable risks of re-awakening tuberculosis than by an osteotomy.

On the whole, simple *redressment* remains, in every way, *more certainly benign than osteotomy*. With redressment you would have no operative complications, whilst you might



Fig. 397. — Luxation.

perhaps have them with osteotomy: immediate infection of the small wound, or secondary infection of the periosteal hæmatoma.

For this reason I do not hesitate to recommend to you, practitioners and non-specialists, *redressment rather than osteotomy* for all cases where some movement persists.

C. — Luxation of the femur in hip disease.

We ought to speak here of *complete* luxations of the femur, which we must guard against confounding with a simple over-riding of the head in the acetabulum made larger by wearing of the bone; over-riding of this kind is as frequent as luxation is rare (fig. 397 and 471).

You will without doubt never see luxation at the *onset* of hip disease (I have seen only one case in 17 years) and, if you do see it, you will reduce it without chloroform by the manœuvres one carries out for congenital dislocation of the hip (v. chap. xiv).

But you will have occasion to see luxations **following** hip disease in spite of the fact that complete dislocation, as the last stage of the disease, is exceptional if the case has been looked after.

The diagnosis is easy to establish by radiography. In the absence of the X rays, it is very delicate, except in the cases where, by palpation, one can distinctly feel the head of the femur in the buttock; but this is rare, because the surrounding tissues are hardened, and especially because the head of the femur and even the neck are more or less eroded or destroyed in these varieties of hip disease.

To make the diagnosis in these cases, one may admit that, as a general rule, if the trochanter is more than 4 cm. above Nelaton's line, there is a true luxation of the femur; below 4 cm. it is a question rather of a simple over-riding of the head in the acetabulum, without the head having escaped from the enlarged cavity.

The **treatment** of pathological **luxations** of the femur is very **difficult**, but one is not completely helpless, far from it.

Without reckoning that one can always correct the flexion and adduction which generally accompany dislocation, one may yet manage to correct it, either by « reducing » the head, if it is in good condition, which is rare, or, when the head is destroyed, by supporting in the bottom of the acetabulum the upper extremity of the trochanter, which is always preserved (v. p. 460).

HIP-JOINT DISEASE ASSOCIATED WITH OTHER TUBERCULOSES

a. Double Hip-Joint Disease.

Double coxitis is rare; fortunately so, because it is very grave from an orthopædic point of view.

Double coxitis would not be so formidable if the patient would come at the very beginning, and be treated with early articular injections; — but that is scarcely ever the case, and then the disease becomes aggravated rapidly; the bilaterality of the coxitis shews already that serious tuberculosis is at work, and serious tuberculosis does not remain at the first degree, neither on one or the other side. It leads nearly always to deformity and to abscesses (vide second and third varieties).

And so we are « caught in a dilemma »; either the limbs are not sufficiently immobilised in which case the deformity continues to progress, or they are placed in a large plaster, and a double ankylosis will result. But, if ankylosis of *one hip only* does not prevent the patient walking, *bilateral* ankylosis is disastrous for walking, for sitting down or bending, in a word, for all the natural and physiological functions.

You see that, whatever is done, the orthopædic prognosis of double coxitis remains bad. Further, abscesses are of frequent occurrence, they are more grave, more liable to open than in simple coxitis and there is generally a persisting fistula, the evil consequences of which you know.

What is the course to take?

When you chance to see a double coxitis at its onset, do

not neglect to endeavour to stop the evolution of tuberculosis (by intra-articular injections).

As to **orthopædic treatment** : rest on a frame with continuous extension well looked after. And, in a general way,

prefer extension to a plaster, because extension safeguards the mobility of the joint.

If rotation of the limb, exists outwards or inwards, meet it by the means shewn in the figures 852 to 854.

But extension is not always sufficient to prevent deformity being produced or to soothe very troublesome pain. It will then be necessary to have recourse to the plaster for a while. But return to the extension as soon as possible.

What can be done against the deformity and stiffness already produced?

If the deformity and stiffness are next to nothing, leave them alone.

If the deformity is very marked (more than 30°) correct it gently, supporting with a plaster

for two months, then go on with the continuous extension.

In the case of stiffness, if there exist at the same time a bad position, correct it (you know how) **without troubling to restore mobility**.

If the hip joints are stiff but in a good position, do not touch them : not that there are *no operations proposed* for mobilising the joints, *there are too many* !



Fig. 398. — Coxitis and middle dorsal Pott's disease. — The plaster is provided with a dorsal opening for compression of the gibbosity, and a pre-inguinal one for articular injections (or for the treatment of an abscess of the hip joint).

Do not perform any of these because, with the best of them, you will run at least nine chances out of ten of doing more harm than good.

b. Coxitis with Pott's Disease (fig. 398).

The prognosis for good walking is very poor, especially when the Pott's disease is situated in the lower part of the vertebral column : which one can understand, because the Pott's disease causing an ankylosis of the lumbar spine and the Hip disease leaving behind it so often a rigid hip, the child will be helpless with this double ankylosis.

The *treatment*. — One encloses in a single plaster the trunk and the whole of the lower limb.

If the large plaster is badly tolerated, take off the leg portion, and first endeavour especially to cure the Pott's disease by the ordinary treatment (see *Pott's disease*); for the hip disease, make simply continuous extension (at the same time articular injections). Afterwards, when the Pott's disease has been cured, you will complete, if need be, the correction of the hip.

c. Hip Joint Disease with White Swelling of the Knee on the same side.

One treats the two diseases at the same time by making either extension, or a **large** bivalve plaster, and one endeavours to preserve some movements as much as one can (early injections).

d. Hip Disease co-existing with Multiple Bacillary Infections.

See Chap. xx, *On multiple tuberculoses*.

II. — 2nd. PART OF THE TREATMENT. TECHNIQUE.

The technique of the treatment of Hip Disease comprises :

1st. The manner of ensuring rest for the hip in the lying position, on a frame;

2nd. Continuous extension ;

3rd. The Plaster apparatus ;

4th. Redressment of the hip (simple redressment, with or without tenotomy or osteotomy);

- 5th. Treatment of the abscess of hip disease;
 6th. Drainage and resection of the hip joint.

1. REST ON A FRAME

Does it not seem useless to devote a chapter upon the way to ensure rest for the hip in the recumbent posture?

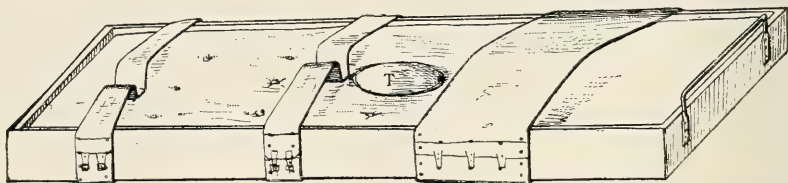


Fig. 399. — Our frame. — An ordinary frame arranged with a median opening on a level with the seat: the opening is closed at ordinary times by a tampon (T).

I do not think so.

It seems sufficient, does it not, to place the patient on a bed? Yes, doubtless, if the mattress is hard, even, and quite flat; and if the bed can be easily carried out of doors, to allow of the child passing the whole day in the open air.

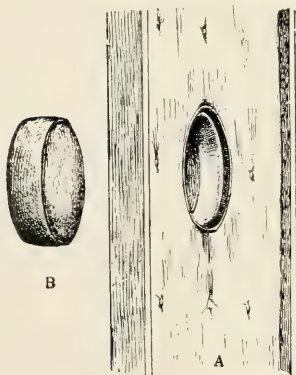


Fig. 400. — Our frame. — An utensil in place, seen from above — B. cushioned tampon which serves to take the place of the utensil when the latter is not required.

It is more practical to place the patient on an ordinary board well stuffed and moveable; or better still on a **wooden frame padded with horse-hair**, provided on each side with stops for the straps destined to restrain the body; the straps are fixed at one side and are buckled at the other (fig. 399).

At the two extremities of the board or of the frame are two iron handles to carry the child into the open air, either into the garden on two chairs, or on a small carriage. The cushioned board or frame may be made anywhere. Your cabinet maker or upholsterer will make it for you.

These very simple means are excellent. But for the cases

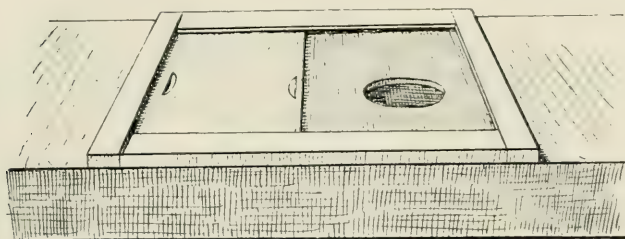


Fig. 401. — Our frame seen from below with its slide.

where absolutely perfect rest for the hip is necessary, I object to them, as they allow the child to alter his position and do

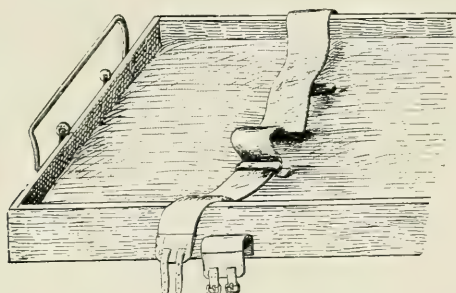


Fig. 402. — Our « frame ». — The strap for the legs is fixed by its middle part to embrace the limb in a buckle.

not permit of his using the bed-pan without inevitably causing an unnecessary jerk and displacement of the hip.

To do away with these avoidable movements, I have had frames constructed with a large median opening, made on a level with the seat (fig. 400). When not wanted, the median opening is filled exactly with a cushion, evenly rounded, pushed in and supported by a board sliding in grooves beneath the frame (fig. 401).

At the moment of using the bed-pan, you draw the board, take out the cushion and slide in its place an utensil of suitable

size and dimensions, which is thus adapted to the opening; one draws the board underneath to keep the utensil in place, in the same way as the cushion, for the necessary length of time.

To be assured more exactly of **the fixation of the legs**, one can arrange the straps for the legs and knees in a double loop for each limb (fig. 402 and 403).

The **fixation** of the **trunk** is effected by two broad straps,



Fig. 403. — Child on his frame. One sees the two straps on the legs and thighs, fixed by their middle portion and embracing the limbs in a double loop. Counter-extension is obtained by the weight of the body, provided that the lower end of the frame is raised by one or two bricks placed under the feet of the wooden supports.

or by a waistcoat of ticking passed over the shirt, a waistcoat of which the two shoulders and lower edges are fixed, by leather straps to the sides of the frame.

In Bonnet's splint, there is a similar method of fixation; but Bonnet's splint is dear and not easily obtainable. It has another more serious objection : the Bonnet splint is generally badly constructed, is not sufficiently even and flat; it is easily depressed and put out of shape, and masks the deformity which progresses unobserved, so that "one very often removes from a Bonnet's splint a deformed child".

I like much better to employ the ordinary frame as I have modified it. It has the same advantages as the splint without

having its inconveniences: it can be made by any cabinet maker at a very low price; it may be completed by a hard and even mattress made by an upholsterer or even by the child's mother. The mattress ought to be a little thicker at the level of the seat, to support the pelvis raised up and to prevent hollowing of the back.

One can adapt to the lower extremity of the frame transverse rods, on which, in a groove in place of a pulley, you can pass a cord for continuous extension (fig. 402).

I prefer **the two limbs** to be **supported** for two reasons; the first is that the sound limb being free might, by its exaggerated movements, impart slight shocks to the pelvis; the second is that it is important, for the future, that the two limbs may be placed under the same regime of absolute rest for the duration of the disease, especially when one is trying to obtain a perfect cure, as is here the case.

As a matter of fact, the cure could not be perfect if one of the limbs — the affected one — were forcibly immobilised — whilst the other — the sound one — could move about unrestrained in the bed. After a year or two of this regime the restrained leg would waste, whilst the free leg would very often have become hypertrophied.

When the patient begins to walk again he will not be able to do so symmetrically if one leg is feeble and the other very strong. If the two legs are equally feeble, on the contrary, they will demand the same effort; they will resume symmetrically and simultaneously their power and their usefulness. The legs being more equal, walking will be more regular and the cure more perfect.

So as to omit nothing, we may add that the children lying down are generally clothed in long blouses of flannel, open behind from top to bottom.

At meal times, one allows the child to raise his head slightly whilst his shoulders are steadied by a small cushion.

To entertain the children, we promenade them once or twice a day in small carriages, *on a flat field*, to avoid shaking.

About every six weeks, one takes the child from his frame or out of his splint, placing him on an ordinary table, which allows one to verify the position and the condition of the joint. The mother will avail herself of the opportunity and make the



Fig. 404. — Legging made of ticking or of leather for continuous extension.

complete toilet of the little patient. This monthly examination helps to prevent the hip joint becoming stiff.

2. CONTINUOUS-EXTENSION

You know already well enough how to make continuous



Fig. 405. — Extemporised apparatus for continuous extension. The foot is bandaged up to the malleoli. A strip is placed in stirrup fashion under the sole; the two ends of this strip are applied to the limb up to the groin.

extension for fractures of the thigh; you have only to apply it in the treatment of hip disease.

There are many ways of fixing to the affected limb the lines



Fig. 406. — The two tails of the stirrup are covered to above the knee. They are afterwards turned on each side of the limb and the bandage is rolled downwards over them to the malleoli.

which sustain the extension weights. If you have a method you are familiar with, keep to it.

If you are used to strips of diachylon, all is well; make them run up to the upper third of the thigh so that they act on that and not on the leg.

If you have no method you prefer, this is what I advise, because it may be used everywhere and the parents are in a general way able to look well after the child in your absence.

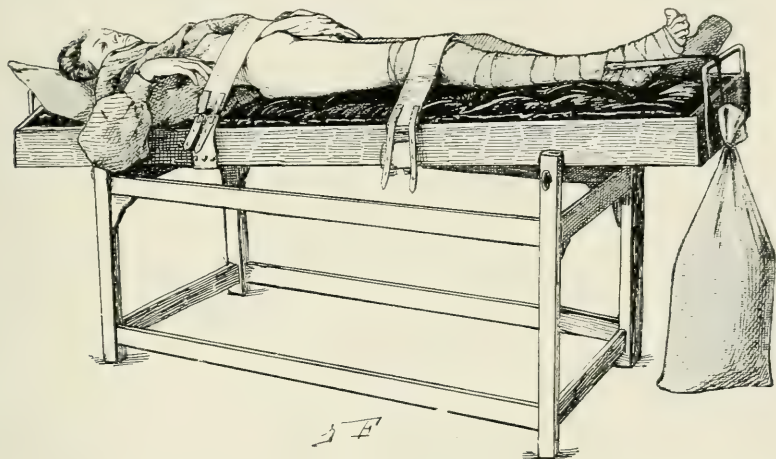


Fig. 407. — Continuous extension. — The patient is put to bed and kept there with our extension apparatus. Counter-extension is secured by the raising (at the lower end) of the chassis upon which the splint rests.

a necessary condition in order that the extension may be properly continued.

Extension

a) *Extension*. — Have made in ticking, or better still in soft leather, a long stocking which reaches to the upper third of the thigh, laced in front, with eyelets, and a « tongue » as used with boots (fig. 404). There should be no seam at the heel: you may even make an opening to avoid any sore at that point. From the calf of the stocking starts, on each side, a leathern thong, which is kept away from the malleoli, in order to avoid all pressure, by means of a wooden rod placed transversely, slightly longer than the breadth of the sole of the foot.

and at each extremity of which is found a hook passing through a hole at the extremity of each leathern thong.

At the middle part of the rod is another hook to which the cord for carrying the weight is fixed; this cord passes over a pulley, or, in default of a pulley, over the transverse bar at the foot of the bed or of the frame; or even through a hole cut out of the end board of the frame or wooden bed. Nothing is more easy to adapt. At the extremity of the cord one fixes

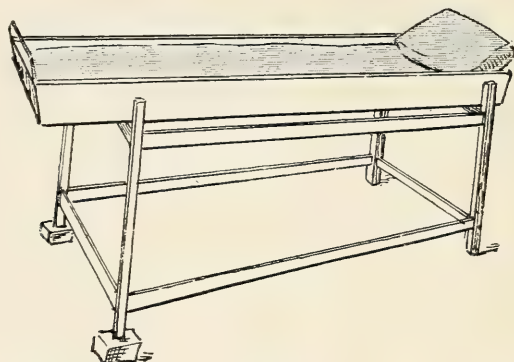


Fig. 408. — Counter-extension is very easily effected by placing bricks under the feet of the fore part of the bed or of the chassis which supports the frame.

leaden weights or sand-bags, weighing 2, 3, 4 kilogrammes according to the age of the child and the result which is aimed at. If you are correcting a deformity, you increase the weight up to 6, 8, 10 kilogrammes.

The stocking should be laced more or less tightly, in any case so firmly that it is not displaced by the weights.

It is a matter of feeling on the part of the mothers, who have to watch for the amount the child will tolerate.

Counter-extension

b) *Counter-extension*. — The most simple method of effecting this is to raise the feet of the bed, and fix the patient, that is, restrain the child's trunk on the bed or frame by means of a few Velpeau bandages (v. fig. 407, 408). One

might also make counter-extension by placing a skein of very soft wool in the groin and adapting the two extremities of this skein to two rings fixed at the upper part of the little bed, in such a way as to pull from above on the corresponding side of the pelvis of the child. If the limb is in abduction, the skein is placed in the groin of the affected side. If the limb is in adduc-

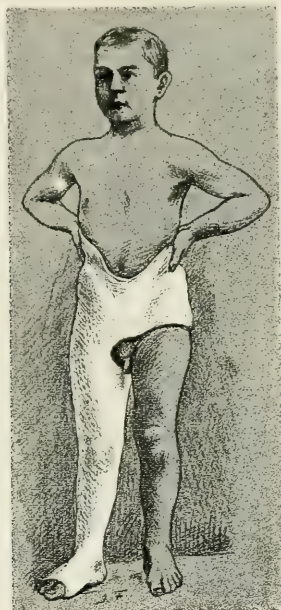


Fig. 409. — The large plaster for hip joint disease.

tion, the skein will be placed in the groin of the sound side.

Steadying the trunk with a closely fitting *waistcoat of ticking*, the ends of which are fixed to the frame, also ensures counter-extension.

After a while, a very short time, the care of the extension may be confided to the mother or to a nurse; that is why I suggest this system in preference to any other, because the practitioner himself can scarcely exercise superintendence every moment. By following carefully your instructions and after a

little practice, intelligent mothers will learn to do much by continuous extension; but this therapeutic method demands very great care and a certain amount of skill. If you have no one you can rely on, it is better to give it up.



Fig. 410. — The medium plaster.

In hospitals where there are many patients, it is not the most practicable system.

Lastly, one must not expect more from continuous extension than it can yield. There are some cases of **painful** hip disease or of *obstinate deformities*, where it will not answer.

The pain can only be soothed by a good plaster, and the deformity will only be effaced by correction made under chloroform and this correction cannot be completely maintained except by a large, well-made plaster apparatus.

3. THE METHOD OF MAKING A PLASTER FOR HIP DISEASE.

There are three patterns of plaster apparatus for the treatment of hip disease¹. They differ only in their lower part.

The *large plaster* reaches from the false ribs to the toes (fig. 409).

The *medium plaster* stops at the middle of the leg (fig. 410).

The *small plaster* stops at the line of the knee-joint, and leaves the movements of the knee at liberty (fig. 411).

The Indications for the Large, the Medium and the Small Plasters.

The first is indispensable in the painful cases of hip disease or those having a tendency to be deformed; more simply let us say that it is applied to all hip diseases (without distinction) during the period of development of the disease.

The second is applied to cases which are cured, when the patient is first allowed to stand.

The third is used six months later. It is worn for a year and a half at least, until all apparatus are dispensed with.

For town children, the medium and the small plasters are not often used. Instead of them, when the child begins to walk, he wears a large celluloid, rigid at the hip joint, but jointed at the knee and at the foot.

We have pointed out at length, in our first chapter, the technique of the plaster apparatus and we refer you to it for all the generalities. We will mention here only what specially refers to the plaster for hip disease.



Fig. 411. — The small plaster apparatus for walking (applied when the hip disease is cured).

1. See thesis of Dr. L. Saint-Beat, 1906.

There are **two conditions** to fulfil in order to make a good apparatus for hip disease.

The *first* is, *not to interpose* between the plaster and the parts to be supported a layer of *cotton wool*, allowing the bones, when the wool has become uneven, to move in the interior of the apparatus.

The *second* condition, is to *carefully shape* the upper margin

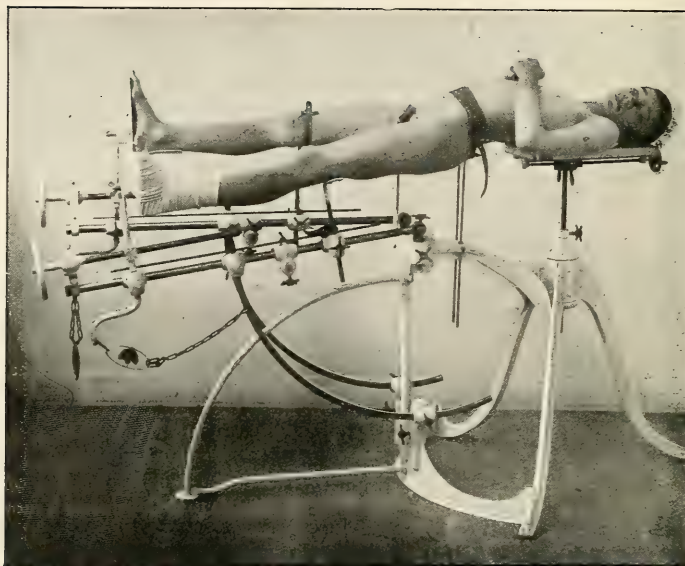


Fig. 412. — Calot table for the construction of plaster apparatus for the lower limb.

of the pelvis, to mould the iliac crests by pressing into the plaster with the thumb, above the crests. Without this, they will be able to rise and fall freely and deformity will be reproduced inside the plaster and in spite of the plaster.

Here are a few simple and safe rules which must be followed in order to make a good plaster for hip disease at the first attempt.

a. *As to the covering of the subject*, instead of cotton wool, cover the child with an ordinary jersey — or even two jerseys one over the other (slipped on **like pants**) : the sleeve will

cover the leg, and the lower border of the jersey will become the upper border (fig. 415).

For the large apparatus, which reaches from the false ribs down to the toes, as the sleeve ends at the middle of the leg and does not cover the foot, you will make a sock of the other sleeve of the jersey cut beforehand. The upper border of such

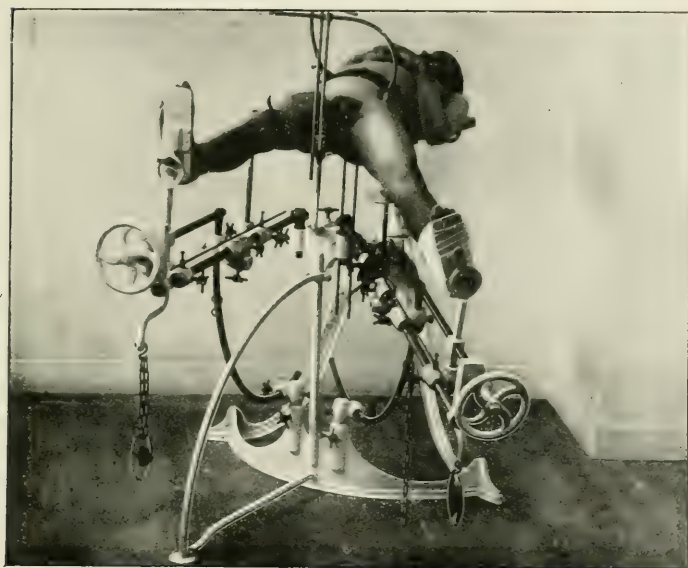


Fig. 413. — By pushing or by pulling (with the control of the dynamometer), one makes abduction or adduction, rotation, external or internal, flexion or hyperextension.

sock will overlap the lower extremity of the other sleeve about as far as the knee.

The child thus clothed in jersey, or rather double jersey, is placed upon a pelvi-support of which the plane of support is situated at 15 or 20 cm. above the plane of the table — a pelvi-support which you can improvise everywhere, with two boxes, two foot-stools or two piles of books, in such a way as to support on the one part the shoulders and the head, and on the other part the pelvis of the patient (v. fig. 416).

The feet are held in the desired position by an assistant who pulls on the sound leg, if it is the shorter, or pushes against it if it is longer than the affected leg; a second assis-

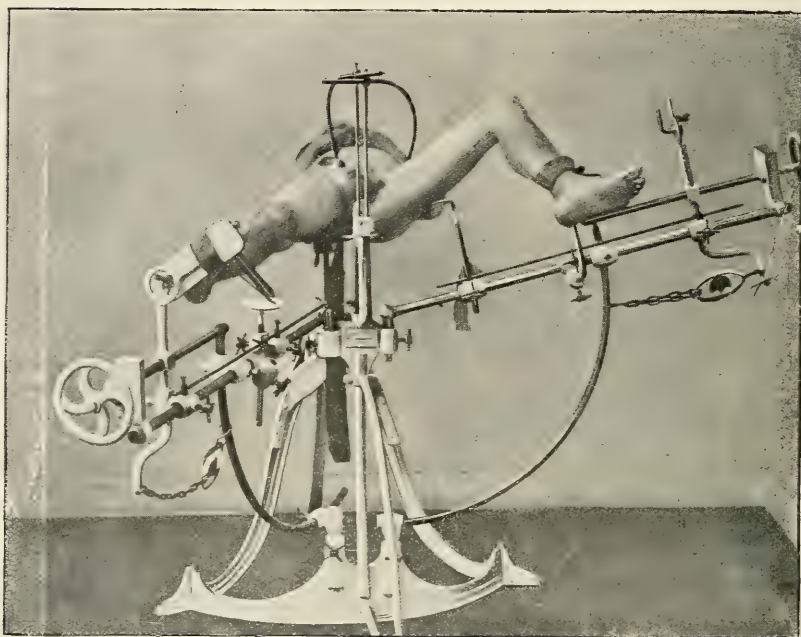


Fig. 414. — Our table for hip disease which may be used in the treatment of other orthopaedic affections of the lower limbs (for instance the congenital luxation of the hip joint). The pelvis is firmly fixed and the iliac crests are modelled by two cup-shaped pieces or metal splints. The left thigh is found here in the position we have given for the treatment of luxation of the hip joint in coxitis (v. fig. 461) and also for the treatment of congenital luxation of the hip joint; the left thigh is found in the "first position", that of the first plaster in the treatment of luxation, while the right thigh is found in the "second position", that of the second plaster (v. pp. 746 and 751).

tant presses upon the knee of the affected leg and upon the pelvis in order to keep up extension or hyper-extension.

Keep then, in your practice, to the employment of these improvised pelvic supports. So you see that there is no need to buy beforehand these pelvic supports or those tables which

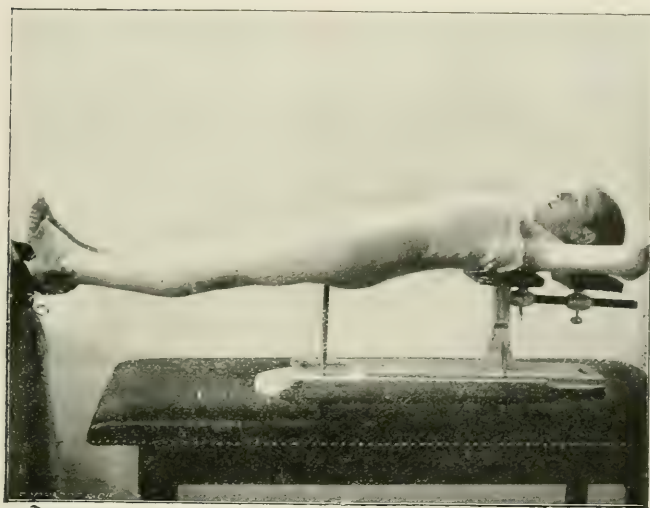


Fig. 415. — The child clothed in his simple or double "tights", worn after the manner of pants.

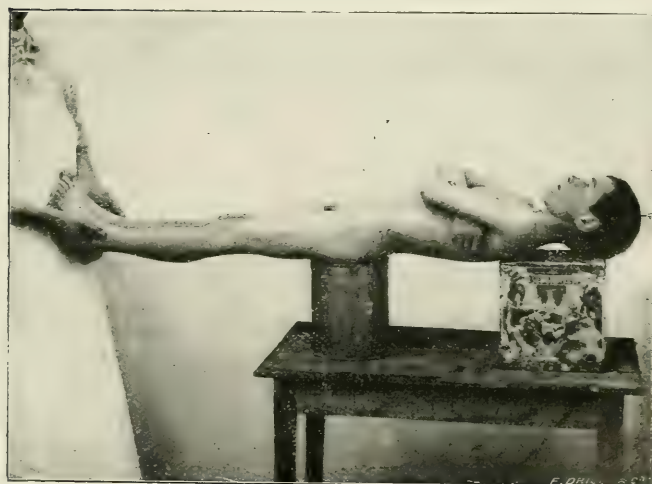


Fig. 416. — Improved pelvic-support.

are invented almost everywhere and which are only “objets de luxe”. We have had a table constructed ourselves and we give a representation of it here (see fig. 412 to 414) in order to show you precisely, that its role may be filled as perfectly, and at much less expense, by the improvised support of which I have spoken (v. fig. 415 and 416), with the help of



Fig. 417. — Rolling the first bandage.

assistants, also improvised, which you will find everywhere, in the very surroundings of your patient.

b. *Construction of the Plaster.*

You prepare your **plastered strips** in the way described for the apparatus in Pott's disease, that is, you will prefer plastered strips dusted beforehand to strips dipped in the plaster cream (see Chap. I and Chap. V).

You apply the strips, observing the recommendations already given.

You must **spread out** the strips, apply them **exactly**,

but **without pressure**. If you spread them out, there will be no ridges and no hurting. If they are applied exactly, the apparatus will not be too loose. If they are applied without pressure, the apparatus will not be too tight (fig. 417).

Circular turns are made over the trunk, without it being necessary to make reverses. At the groin, make a spica, as you would with a linen bandage. At the thigh, at the leg and



Fig. 418. — The last strip.

at the foot, again make circular turns exactly applied, without reverses (fig. 418).

There must be three strips ¹ 5 metres long and from 10 to 12 cm. wide, for a plaster for a child of ten years.

Remember that the apparatus breaks especially in the inguinal region. Strengthen it at that point by folding the strip several times on itself, or by overlapping several spicas one over the other (fig. 419), or more simply with a plastered attelle passed “*en cravate*” around the hip joint (Fig. 420).

1. Three strips suffice, provided that attelles are added.

The Plastered Strengthening Attelles.

The apparatus may be made exclusively of strips, but I would advise you to make it rather with strips and attelles, as

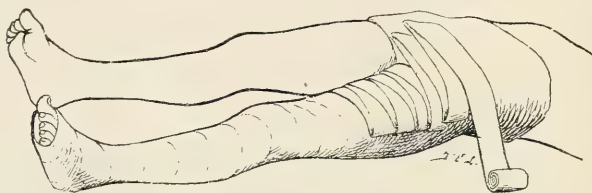


Fig. 419. — To consolidate the fragile part of the apparatus at the level of the affected groin, one folds the bandage over itself several times which takes the place of the strengthening pads.

you did in the plaster for Pott's disease. The plaster is then stronger, more regular and more easy to make.

We have described in the *Generalities*, Chap. I, the method of preparing attelles and plaster cream.

For a plaster in hip disease, we introduce four attelles.



Fig. 420. — Attelle "en cravate" for strengthening the groin

a. The attelle "en cravate" already pointed out, is made with three thicknesses of tarlatan 12 cm. wide and of a length sufficient for surrounding the hip joint (fig. 420).

b. A circular pelvic attelle to strengthen the pelvic and abdominal portion of the apparatus (three thicknesses of tarlatan : length equal to the circumference of the pelvis, height equal to the distance from false ribs to the line of the trochanters, fig. 421).

c. and d. Two attelles intended to strengthen, in front and behind, the leg portion of the apparatus. They have a

length equal to the distance from the iliac spine to the toes and a breadth equal to half the greatest circumference of the thigh.



Fig. 421. — The circular attelle for the abdomen.

You may replace these two attelles by a single attelle, like a splint (fig. 421 bis). The respective place of the attelles and the

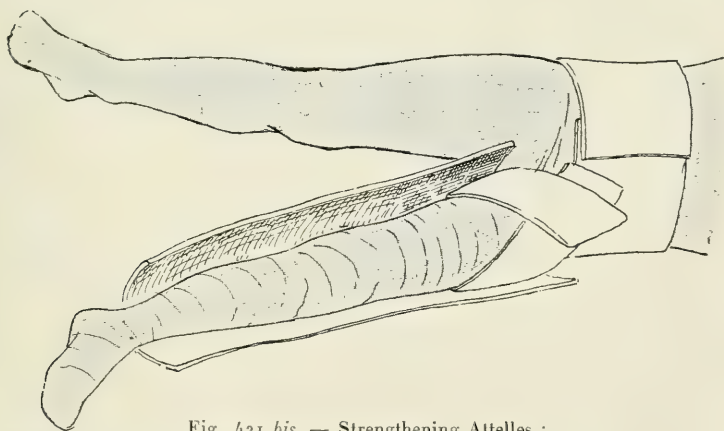


Fig. 421 bis. — Strengthening Attelles :

1. As a waist-belt. — 2. "*en cravate*" at the root of the thigh. — 3. As a splint beneath the limb; this replaces the two attelles, anterior and posterior.

strips is the same as for the plaster corset (see Chap. v), that is, you make a first covering with the plastered strip. then you

place in position the four attelles, and lastly you make, over the whole, a second covering with strips.

Between the different layers of plaster, to strengthen them, you spread with the hand a **layer** of 1 to 2 mm. of **paste** (true mortar) which binds the whole.

e. How to model the supported parts (iliac crests, knee).



Fig. 422. — The apparatus finished, the child is replaced on the table. — Carefully verify and rectify the position. — Model the iliac crests. — Enclose the patella between two lateral depressions.

The modelling is done when the child has been taken down from the pelvi-support and replaced on the table, a few minutes before the plaster sets (figs. 422 to 429).

The iliac crests are modelled by making above (not upon the crests themselves, but above) and in front of them, a depression in the plaster with the hands slightly flexed, the thumb in front, the other fingers above. Press down also the plaster below the iliac crests, in such a way as to place them between two depressions; the upper one the deeper, in the ilio-costal space, and the lower, less marked, over the external iliac fossa.

With the hands, you lower or raise one of the sides of the

pelvis, according to the indications which are present. Apply the plaster evenly over the condyles of the femur and on each side of the patella, enclosing consequently the patella between two depressions.

There is no other secret in making perfect apparatus for hip



Fig. 423.

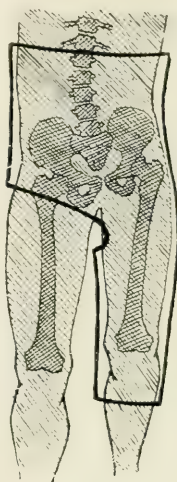


Fig. 424.

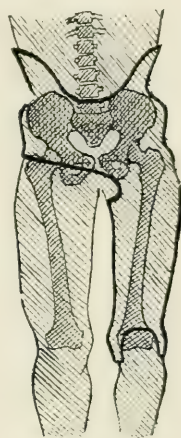


Fig. 425.

Fig. 423. — A bad apparatus : — apparatus without any depressions, such as are unfortunately too often made.

Fig. 424. — In this apparatus the iliac bones can be freely inclined and displaced
A badly made apparatus.

Fig. 425. — A well-made apparatus, well modelled over the iliac crests and at each side of the patella. The iliac bones cannot be displaced either upwards nor downwards. The knee cannot turn in the apparatus.

disease, and in it all, you see, there is no “witchcraft”.

With such a plaster, a leg which is in a good position cannot possibly lose that position (fig. 430).

As to vicious positions, when once rectified and maintained by a good plaster, the correction will not lose even — I do not say centimetres, as is the case with apparatus made by certain careless surgeons — but millimetres.

Trimming the Apparatus. — A quarter or half an hour

after the plaster is "set", trim and make the edges even by cutting down to the jersey only. Cut first the upper edge of



Fig. 426. — Method of moulding the iliac crests; — position of the hands for moulding the apparatus upon the iliac crests.

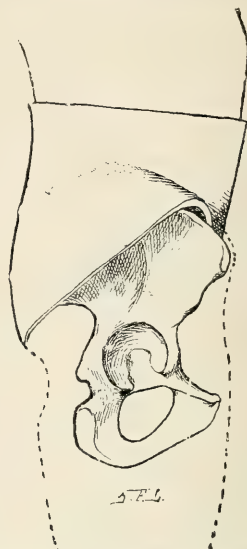


Fig. 427. — Sketch of an apparatus well modelled above the iliac bones.

the plaster over the abdomen, in the form of a crescent, in



Fig. 428. — Schematic sketch of the knee in a **badly made apparatus**; the apparatus being circular, the knee is able to turn round in every direction.

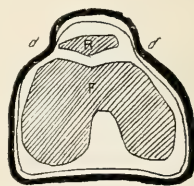


Fig. 429. — **An apparatus well made.** The depressions made at d, on each side of the patella, prevent the knee turning round.

such a way as to leave the umbilicus exposed, then disengage the genital organs and the toes (v. fig. 409). After which, the

child may be carried back to his bed; but it is wise not to move him too much until the next day; during those twenty four hours, the plaster, still drier, will have gained much in resistance.

Openings in the Plaster. — It is only on the next day that



Fig. 430. — The plaster in its rough state.

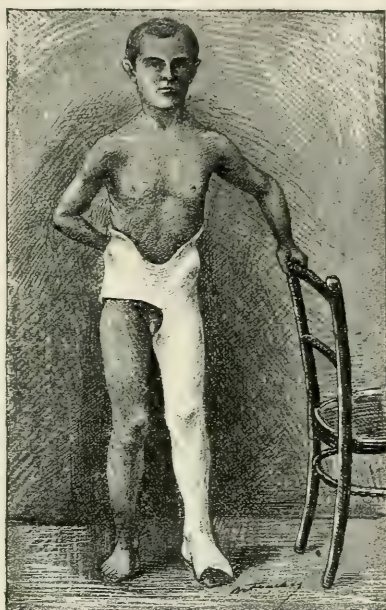


Fig. 430 bis. — The plaster trimmed and polished.

you will make any opening necessary for treating an abscess or making an injection into the joint (fig. 431).

If the child complains of pain at some point — heel, malleoli, iliac spines — you may release those points by removing a small piece of plaster, as it were punched out. The openings, great or small, are simply made with a good knife; cut millimetre by millimetre until you feel you no longer cut the plaster but touch the jersey; by proceeding cautiously you need have no

fear of touching the skin and you will now appreciate the advantage of the double jersey.

4. — TECHNIQUE OF REDRESSMENT OF THE HIP-JOINT

Before describing this technique, we must remind you of the

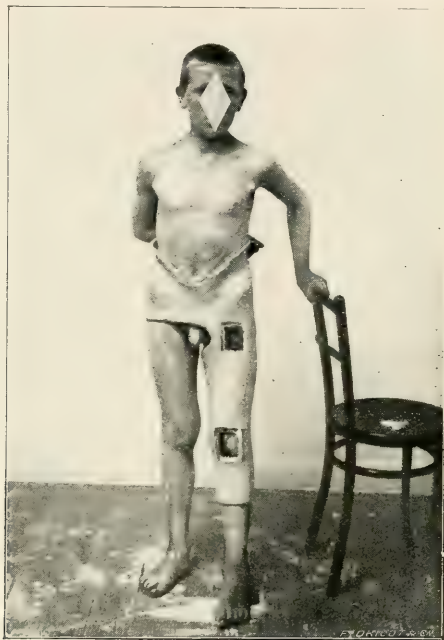


Fig. 431. — The medium plaster with openings at the hip and at the knee.

differences which exist between recent deformities (abduction) and old deformities (adduction).

Abduction at the beginning of hip disease being due to muscular contractions, is nearly always easily corrected.

This is very fortunate. For at the beginning, **especially in the painful cases**, one is dealing with **active tuberculosis**; and our duty is to make the correction by the most gentle and **shortest** manœuvres, abstaining above all, from the manœuvres of movement in all directions so highly praised by Bonnet (of

Lyons), which are unfortunately those described in all the classical treatises.

Violent and prolonged manœuvres are dangerous because they may lead to a bruising of the virulent fungosities and excite inoculation at a distance. One will carry the affected



Fig. 432. — Vicious ankylosis, flexion, adduction and internal rotation.

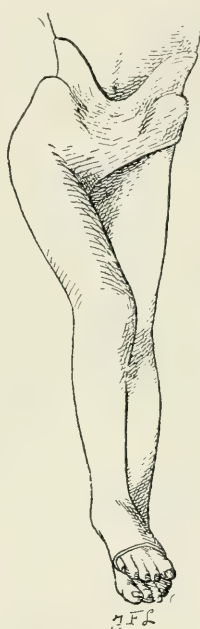


Fig. 433. — Correction without chloroform. First apparatus (1st stage).

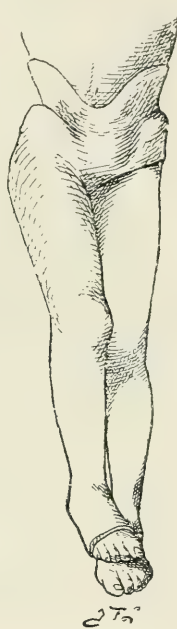


Fig. 434. — Second apparatus (2nd stage).

limb *directly and as gently as possible*, inwards and downwards.

If the correction demands, so as to be complete, some vigorous movements, one will be satisfied, for the time being, with a partial correction to be completed two months later.

The vicious position in adduction supervening in hip disease of old standing, calls for more vigorous tractions.

These manœuvres are then permissible, as the tuberculosis

is very attenuated and sometimes extinct in such old cases of hip disease.

The redressment may be made with or without chloroform.

1st. METHOD : **Correction without Chloroform.**

(By stages : a new plaster every month, fig. 432 to 436).

One may bring about a correction by making a new plaster

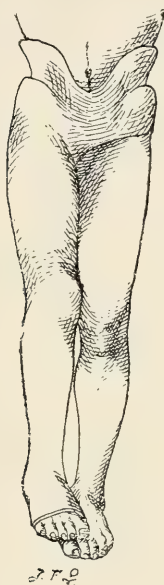


Fig. 435. — Third apparatus
(3rd. stage).

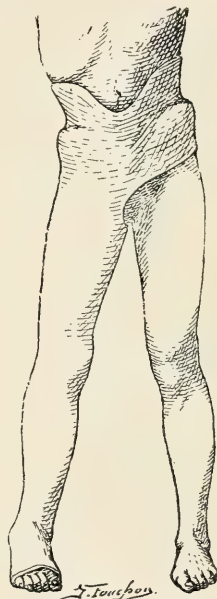


Fig. 436. — Sixth apparatus (6th. stage).
The correction is perfect.

apparatus every month, each new apparatus placing the limb in a position more and more correct. One gains several degrees each time, without pain, by slight traction and slight pressure made immediately after the application of the last plastered strip and kept up until the plaster is quite dry.

One obtains in this way, in the space of from two to four months, surprising and often, complete corrections.

Nevertheless, for very marked deformities, one is generally

obliged to make a last sitting for correction under chloroform, if one wishes to do away with the very slight deformity which persists.

2nd METHOD : **Correction with Chloroform.**

(See *Anæsthesia*, chap. II).

Correction with anæsthesia is very simple; and *unless it is*



Fig. 437. — Right hip disease with extreme abduction.

a case of painless hip disease and of recent and slightly vicious attitude, I advise you to have recourse to it.

With the help of chloroform one can accomplish, in a minute or two, without any violence, the correction of recent deformities. At once, one applies a good plaster apparatus; the whole thing takes from six to ten minutes and secures three months rest and perfect comfort for the child.

It is, as one can see, the most easy and the most rapid method.

We will now describe in order : — 1st, the redressment of recent deformity (in abduction); 2nd, the redressment of an older deformity (in adduction); 3rd, the redressment of old ankylosis of the hip joint; 4th, the treatment of luxations.

1st CASE (fig. 437). — **Hip Disease with Abduction and Lengthening**
(Hip disease dating several weeks or months, more or less painful).

The patient is removed to an ordinary table which is quite

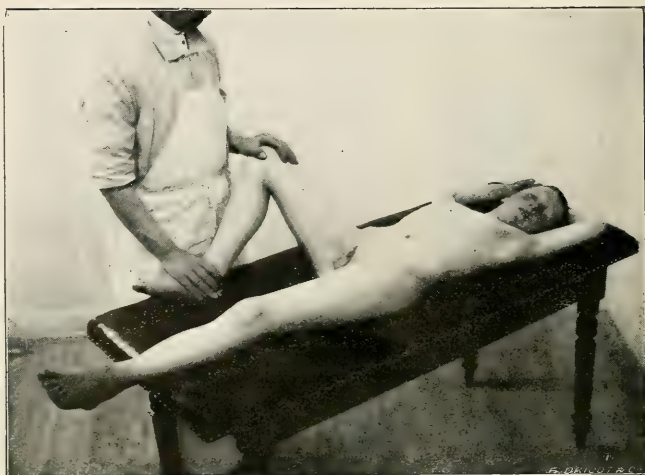


Fig. 438. — **Correction.** *1st stage* : Placing in position the pelvis and trunk.

firm, and then put to sleep. If the coxitis is very painful, the patient should be put to sleep previously in his bed and then carried to the table.

1st STAGE (fig. 438). — *Placing in position the pelvis and trunk.* — Place the trunk and pelvis flat and in good position on the table. This is easily done : it suffices to take the affected leg by the foot and the knee and carry it in the direction of the deviation, that is, further in abduction and in flexion until you have in this way totally obliterated the lumbar hollow and brought back the iliac spine of the affected side to the same level as that of the sound side, so that they are both placed in the same line perpendicular to the axis of the body.

You have thus before your eyes, *in it's entirety*, distinctly seen, the vicious attitude to be corrected.

Fix the trunk and pelvis in the normal position which you have given them.

You cause the affected thigh to manœuvre round the pelvis, in order to bring it back to a correct position.

2nd STAGE (fig. 439). — *Fixation of the Pelvis and Trunk in the Normal Position.* — One assistant only is generally sufficient to effect this fixation; the same one who held the sound

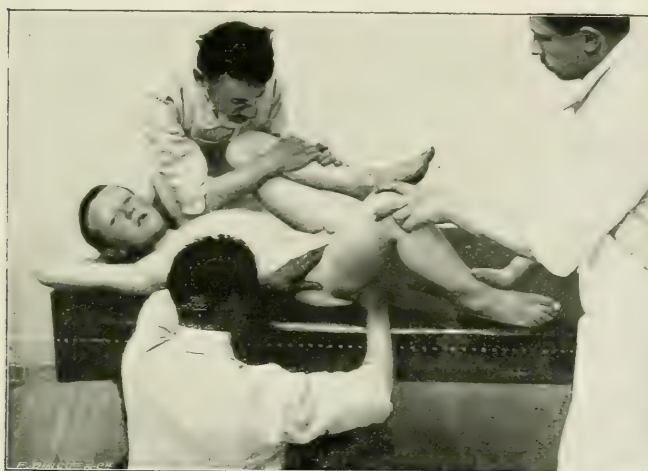


Fig. 439. — **Correction.** 2nd stage: The manner of fixing the pelvis and trunk the normal position.

limb, whilst you were placing the pelvis in position by acting on the affected leg. This assistant bends the sound limb over the abdomen, and **by the intermediation of the flexed limb presses on the trunk and on the pelvis** in such a way as to keep them in close apposition with the table, taking care that the two iliac spines are always at the same level and that the hollow remains obliterated.

An additional assistant will render this fixation still more perfect; kneeling down by the affected side of the patient, seizing with one hand the ischium of the affected side, with

the other the ala of the ilium, he pushes forward the ischium and brings back the iliac crest behind upon the plane of the table, in such a manner as to prevent the iliac crest of the affected side tilting forward, which it will have a tendency to do when you carry the affected femur into good position.

3rd STAGE (fig. 440). — *Correction.* — The pelvis placed in

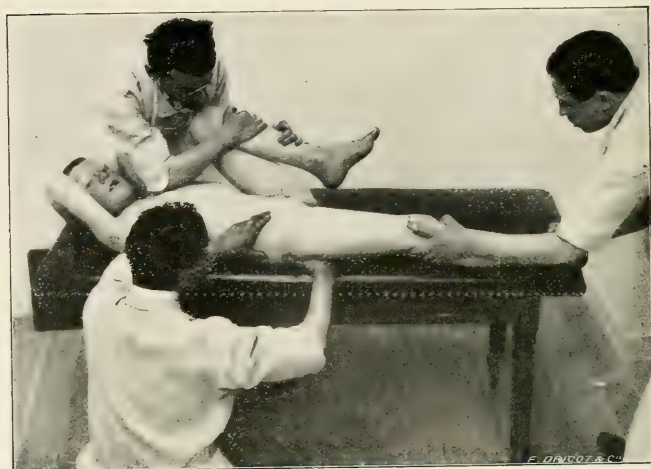


Fig. 440. — 3rd stage. **Correction.** The deformed leg is being carried inwards and downwards by the left hand of the surgeon while the right hand pulls slightly on the foot to facilitate the correction.

position and well fixed, you have only to carry the femur into the normal position :

With one hand you seize the knee, with the other the foot. With the first hand **you pull slightly upon the femur**, as if to detach it from the iliac bone; then, with a simple pressure of one or two kilograms, **you push it directly** into the correct position, that is to say, **inwards and downwards**. It is sufficiently inwards when the knee reaches the prolonged median line of the body, and it is sufficiently downwards when the ham of the affected side touches the table.

Having in view the tendency which the leg will have later

on to pass into adduction, allow an abduction of from 10° to 15° to persist. On the other hand, one ought to go a little further towards deflection and make a slight **hyper-correction**. To do this, carry the pelvis over the lower end of the table and over the affected **knee** for 5 or 10 cm, **below the prolonged plane of the table**, pressing on the knee from above downwards.

This manœuvre requires a few seconds. You verify the

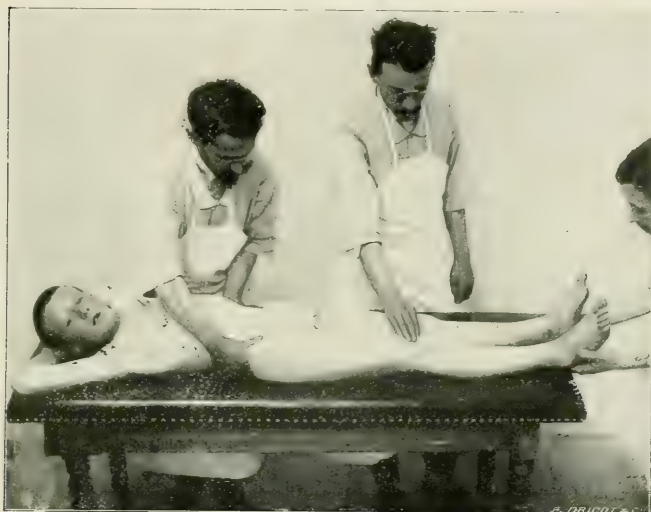


Fig. 441. — **Correction** (*continued*). The sound leg being placed back in extension, the surgeon, holding the feet, verifies the correction.

correction (fig. 441) by taking the two feet (the sound flexed leg has been put into normal extension) and comparing the position of the two malleoli and the two heels, whilst an assistant, one hand on the knee of the affected side, keeps it in the position of hyper-extension.

There is nothing more to be done but to preserve the correction thus obtained, by a plaster apparatus.

4th. STAGE. — *Construction of the Plaster* (see above, p. 420).

5th. STAGE. — *Verification of the Correction a little before the Setting of the Plaster*. — The apparatus being finished,

one removes the child from the pelvi-support, places him gently on the table, the legs projecting over the end to facilitate the hyper-extension. The correction is again verified, completed if need be, and maintained very exactly in position until the plaster becomes dry.

The assistant who models the iliac crests ought to see that

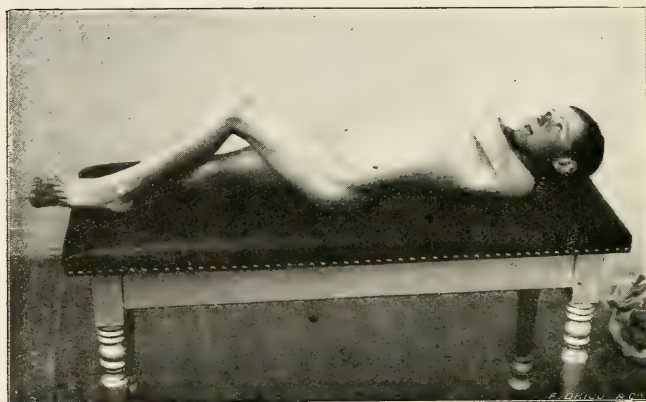


Fig. 442. — Hip disease with adduction already a year and a half old.

the iliac spines are at the same level and that *every trace of the lumbar hollow is obliterated*; to do that, **he presses vigorously** from before backwards (or, more correctly, **from above downwards** in the recumbent position of the trunk).

If necessary, an additional assistant acts on the ischium and the iliac wing, as we have mentioned above, to effect *this obliteration of the hollow*, which can never be overdone. One can assist it indirectly by making hyper-extension of the thigh; to do that, an assistant **presses on the affected knee from above downwards**.

You attend yourself either to the pelvis or to the feet, and control every moment the perfecting of the correction. You pull or push on one foot or the other, asking, if necessary, for the help of the assistant who has his hands above the iliac

crests and who is able, in pushing one or other of the crests, to lower or raise one of the sides of the pelvis¹.

Duration of the Interference.

Correction properly called takes from one to two minutes; the construction of the apparatus, five to ten minutes; the set-

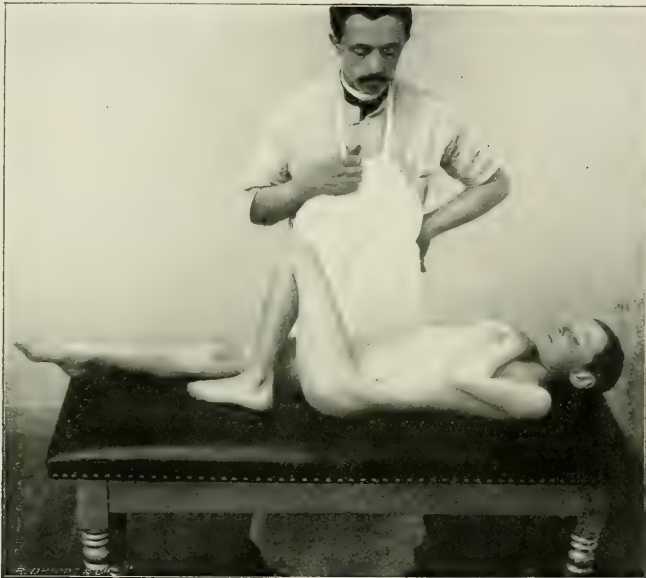


Fig. 443. — **Correction.** *1st stage* : placing in position the pelvis and trunk (the iliac spines are marked by two dots).

ting of the plaster takes, afterwards, six to eight minutes; the entire length of the correction is therefore about fifteen minutes.

I have supposed a case where chloroform has overcome, by itself alone, nearly all resistance. If the deviation in abduction is very old, if it has already produced fibrous adhesions, a weight of from one to two kilograms is evidently not sufficient for correction.

If the resistance of the deviation is greater than that force,

1. If the assistant who grasps the ischium pushes it upwards whilst the surgeon who holds the foot pulls on the leg, you manage thus to fix the hip in the plaster apparatus, with a certain amount of separation of the articular surfaces.

if that force does not give an absolutely perfect correction, it will always give you a very appreciable correction, thanks to chloroform. Do not go further, if you wish to be very prudent. You will complete the partial correction six or eight weeks



Fig. 444. 2nd stage : Fixation of the pelvis and trunk by two assistants, the sound limb bent over the abdomen. Here, the operator alone seizes the leg to move it into the correct position.

later. It will still be easy then, and especially it will be no longer dangerous; for the tuberculosis will have lost much of its virulence by the sole fact of the perfect immobilisation of the hip in a plaster apparatus for those two months.

2nd CASE (fig. 442). — **Hip Disease with Adduction and Shortening**¹. (*This is the ordinary deformity of hip disease of rather long standing, a year or more*).

The correction of adduction (of shortening) necessitates

1. See the thesis of Dr. L. Saint-Béat, 1906.

generally more force than that of abduction; but this correction will be harmless if it is carried out in the following manner :

1st. STAGE (fig. 443). — *Placing in position the pelvis and trunk.* — The pelvis and trunk are placed flat on the table, and in their normal position. This is done as it was for the preceding vicious position, with this difference, that instead of carrying the affected leg into flexion and abduction, one is obliged to carry it into

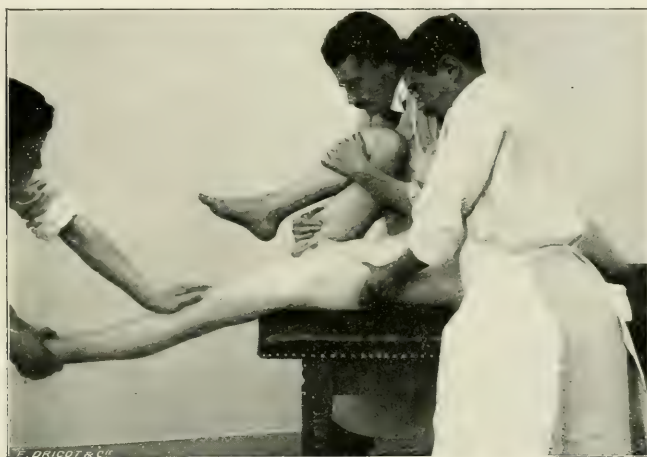


Fig. 445. — 3rd. stage : The correction is finished.

flexion and adduction, so as to succeed in obliterating the lumbar hollow, and to bring the two iliac spines to the same level, towards the same perpendicular to the median axis of the body.

2nd. STAGE (fig. 444). — *Fixation of the pelvis in this position* by one, or better, two assistants (As above, p. 438).

3rd. STAGE (fig. 445). — *Correction.* — You grasp the thigh of the patient above the knee, with both hands, whilst an assistant seizes, with the left hand, the bottom of the leg in the neighbourhood of the malleoli and, with the right hand, grasps the middle of the foot; both of you, by an associated and well-combined effort, pull on the limb so as to detach it from the iliac bone; you pull in the direction of the deviation,

that is, upwards and inwards. Then, when you feel that the leg "holds" less to the pelvis, you carry it at once (pulling all the time) into the normal position, that is, outwards and downwards, in order to obliterate the adduction and flexion.

Adduction is corrected when the internal part of the knee arrives in the prolonged median axis of the body. Flexion

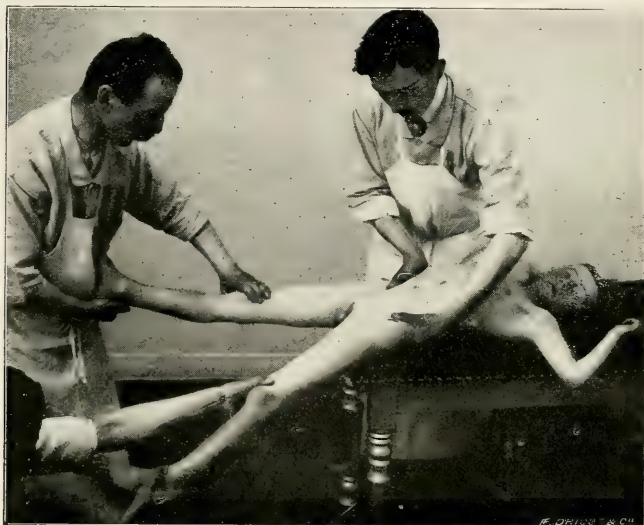


Fig. 446. — The right, sound leg, is placed in extension (for the preparation of the plaster apparatus) and pushed upwards. The left, affected leg, is pulled firmly and carried further in abduction. This traction is made by one or two assistants.

is corrected when the ham touches the surface of the table.

But here, *correction is not quite sufficient*; a **hyper-correction must be made**. We shall have hyper-corrected the flexion when the knee is lowered 10 cm. below the plane of the table, the limbs held outside it. We shall have hyper-corrected adduction when the knee is found to be at 40° or 50° outside the prolonged median axis of the body. We must obtain these 40° or 50° at once if we wish to preserve 15° .

An abduction of from 15° to 20° , if it persists, and if the joint is ankylosed in this position, will compensate the slight

real shortening which exists nearly always in the case where the apparent shortening is very great.

A limb ankylosed in abduction is, as a matter of fact, functionally, that is, practically, a little longer than it ought to be with the osseous material it possesses. Inversely, a leg ankylosed in adduction will be functionally and practically shorter than it's real (it's material) length would suggest.

You will therefore carry the limb into an **abduction of more than 45°**. It will be kept fixed for several months in a plaster apparatus. When adhesions have been produced in this position, you allow the limb to return a little inwards with each new apparatus. It is then easy enough to preserve permanently the 15° which are needed to compensate the real shortening¹.

4th STAGE. — *Verification of the position and plaster.* — Modelling, as above (see fig. 441, page 441).

3rd. CASE : **Ankyloses of the Hip Joint**
(*in cured, or apparently cured, hip disease*).

After the study of the second case comes naturally that of the correction of very old deformities, of the correction of vicious ankyloses *which are only a more advanced stage of the deviation* in adduction of which we have just spoken.

In reality, it is **nearly always** a question (v. p. 406) of **incomplete, non-osseous ankylosis**; if one does not perceive any mobility of the femur, this does not imply that the union is osseous and complete. It is necessary for you to have tried to find movements under chloroform before you can affirm that there are none.

If the ankylosis is incomplete, one effects redressment; if it is osseous, one performs osteotomy.

A. — **CORRECTION BY SIMPLE REDRESSMENT.**

One can perform this redressment² in two ways : **either**

1. Definite persistent abduction ought not to exceed 15 to 20 degrees, because, above that amount it will bring about, in walking, a lowering of the pelvis, prejudicial to the regularity and elegance of the gait.

2. See, **with reference to redressment of ankyloses of the hip**, the excellent thesis, full of information, of Dr. Quettier, of Berck (1894).

without chloroform, in several sittings, at the rate of one every twenty days, by partial corrections and successive plasters. After 3 or 5 plasters and two or three months, the correction is obtained (v. fig. 432 to 436).

Or with chloroform, in one or two sittings.

The second procedure is easier, more certain and less painful to the patient, in spite of contrary appearances.

You know already the direction to give the manœuvres of redressment, but one understands that one ought here to use manœuvres much more vigorous than in the deviations in the same direction occurring in the course of hip disease, and of only a few months standing.

You will redress in the manner described above for the second variety, since the thigh is nearly always in adduction. Proceed gradually, slowly, patiently; correct **especially by firm traction** on the leg, without, however, neglecting the pressure on the knee, or rather on the middle of the femur.

You will break nothing if you correct degree by degree, methodically, **without shocks**.

You must be three or four in number to do this. Whilst two assistants pull on the leg and the foot, two others should make pressure on the thigh and push it downwards and outwards; **make pressure** with four hands evenly and methodically, without discontinuing, for 10, 12, 15 minutes. You will then arrive at the result aimed at — without danger — if you have taken care to press rather on the middle third of the thigh than on the knee exclusively, because exclusive pressure on the knee with the force of such a lever would expose you to a fracture. Or, still better — in order most certainly to avoid this risk — you would take the precaution of placing four wooden splints along the leg from the trochanter to the malleoli, the splints being firmly held with straps; and it is on the middle of the thigh, thus strengthened, that you will exert pressure.

It will often be necessary for you to spend 10 to 15 minutes, or even more, in continuous traction and pressure before

obtaining the required result¹, that is before having carried the affected knee to 15° below the plane of the table and 40° to 50° outside the median axis of the body.

By the manœuvres of redressment described one acts at the same time over all the resistances, which are of two orders :

1st. The *extra articular resistance* proceeding from the con-

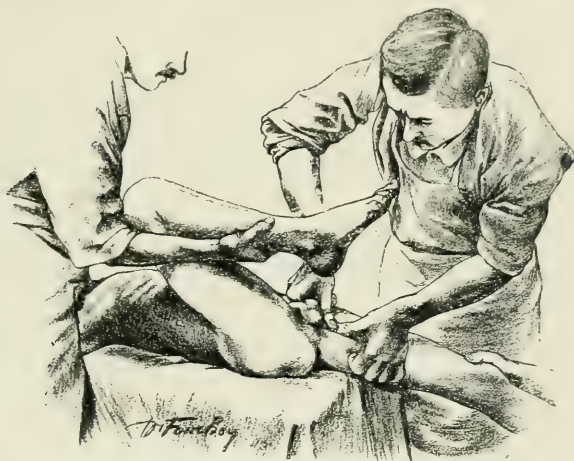


Fig. 447. — Rupture of the adductors. One assistant fixes the pelvis, the other moves the limb into hyper-extension and abduction. The operator presses his thumbs with all his strength, over the point of the upper insertion of adductors.

traction of all the soft tissues, but especially of the adductor and flexor tendons;

2nd. The *articular resistance* arising from contraction of the capsule or from old fibrous or osteo-fibrous adhesions uniting the two osseous extremities.

Instead of acting **at the same time** against the **diverse resistances**, it is often preferable **to isolate them and attack them one after the other**. If then, in commencing the redressment, you are hindered by the cords of the tendons

1. And, in certain cases, you will not reach it at the first attempt. You will have only half a correction — which you would complete at a second sitting for redressment, made three or four weeks later.

which appear very tense and hard, you must, in the first stage, look to them specially and exclusively and thus will more easily overcome this resistance. This obstacle overcome, the redressment will proceed easily, because the contracted tendons represent often half, or even more, of the total resistance.

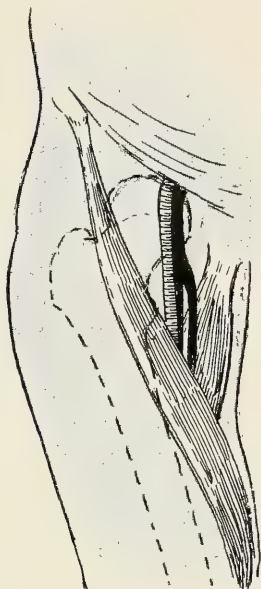


Fig. 448.

Fig. 448. — In adduction, the vessels are in nearer proximity to the adductors than in abduction (consequently, move the thigh outwards as far as possible by moderate movements, before making a tenotomy on the adductors).

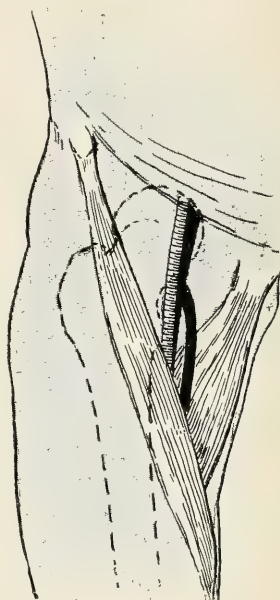


Fig. 449.

Fig. 449. — Relations of the tendons and vessels in the position of abduction.

There are two ways of acting on the tendons : one surgical, the other non-surgical.

If you are not a surgeon *keep always to the latter* and you will succeed simply by the pressure of the thumbs over the projecting cord of the contracted tendons, in making them supple, by kneading them, elongating them and even rupturing them.

a. Rendering supple, kneading and stretching of the tendons. You will carry out the manœuvres indicated in

Chap. *xiv* *à propos* of congenital dislocation of the hip, but you will carry them out with the thigh extended, and not flexed.

b. Rupture of the adductor tendons (fig. 447).

Two thumbs pressing crosswise over the tendinous cord which one or two assistants, pulling the leg outwards, stretch to the utmost. After a pressure of 1 or 2 minutes, one feels under the thumbs a first tendon give way, then a second, then the others, while the limb is carried outwards.



Fig. 450. — Tenotomy of the flexors. — An assistant pulls on the foot with one hand and with the other presses on the knee downwards to throw the flexor tendons into prominence. The tenotome is entered on the inner border of the sartorius, 1 1/2 cm. below the iliac spine. The operator pushes the tendons towards the knife with the fingers of the hand remaining at liberty.

The rupture of the flexor tendons with the thumbs is very difficult and causes a considerable traumatism; but you will succeed in stretching them sufficiently by a long and patient kneading.

c. Tenotomy.

If you are a surgeon, you will prefer tenotomy to rupture of the tendons by pressure of the thumbs. The division is more expeditious and does not require any force.

Sub-cutaneous tenotomy is done (fig. 448 and 449) by an incision of a few millimetres, which **prevents most surely all chance of infection** and is also **simpler**, whatever may have been said to the contrary, than making the section of the tendons by the open method. — If some fibres escape the

tenotome, they are easily ruptured by making traction, after the tenotome has been withdrawn. This supplementary traction is likewise necessary, though in a less degree, in open tenotomy, as the contraction which affects all the tissues of the region can only be overcome by this supplementary traction.

The operation is performed as follows :

Instruments. — 1st, a pointed tenotome; 2nd, a blunt tenotome, or even an ordinary narrow bistoury may be used.

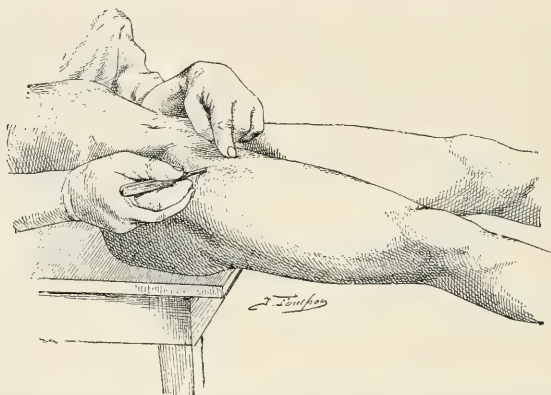


Fig. 451. — Another method of tenotomy of the flexors. Here the tenotome is introduced outside the tendons; the left hand of the operator isolates the vessels exposing the flexor tendons to the edge of the instrument.

a. Division of the flexor tendons near the iliac spine (sartorius, tensor fasciæ, sometimes the rectus).

The division is made at a centimetre and a half below the anterior superior iliac spine, penetrating inside the tendinous cord and cutting in an outward direction.

POSITION OF THE ASSISTANTS (fig. 450). — A first assistant holds the sound limb firmly flexed over the abdomen, to immobilise the pelvis. A second assistant pulls on the affected knee and carries it downwards in extension.

1st. STAGE. — *Cutaneous incision.* — One makes an incision 4 or 5 cm. long with the pointed tenotome, along the internal border of the prominent tendons, one and a half centimetre

below the iliac spine, and one introduces the point to a depth of about two and a half centimetres.

2nd. STAGE. — One turns the tenotome so that the cutting edge is outwards; or, one introduces the blunt tenotome parallel to the incision, to the same depth, then one turns it outwards.

3rd. STAGE. — One cuts with a sawing movement, whilst



Fig. 452. — An assistant draws the leg outwards to make the cord of the adductors prominent. One cuts the tendons from without inwards. The left hand is occupied at first in pushing the tendons towards the tenotome, then in raising the skin to protect it from the movements of the knife.

the left index finger brings up the tendon inwards on to the edge of the tenotome. One avoids perforating the skin on the outer side with the point of the tenotome.

4th. STAGE. — A jerk and a cutaneous depression follow the section of the tendons. The tenotome is withdrawn; through the skin you **press very firmly** on the vessels to ensure hæmostasis.

By your pressure and by some traction by the assistant at the knee the division of the tendons and the correction of the flexion are accomplished.

b. Tenotomy of the Adductors (fig. 452 and 453).



Fig. 453. — Tenotomy of the adductors. The tenotome is conducted by the left index finger, the pulp of which pushes the vessels to the outside.

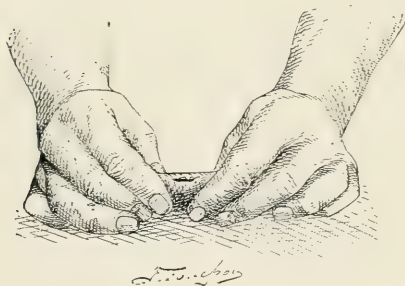


Fig. 454. — Hæmostasis after tenotomy : one expels the blood by pressing firmly the two lips of skin, after which, one makes compression.

The operation is based upon the same principles as the preceding one, with the few slight modifications which one anticipates; the **tenotome penetrates outside of the tendons** and not on the inner side, the assistants drawing the limb outwards and not downwards. The division is made one centimetre below the upper insertions along the external border of

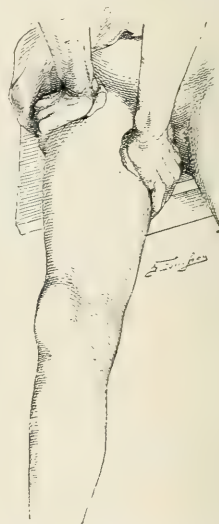


Fig. 455. — Hæmostasis. An assistant compresses firmly with his two hands, furnished with tampons, the two small wounds produced by the double tenotomy.

the cord made prominent by traction outwards. The operator stands at the outer side of the affected limb.

The left index finger is placed on the prominent cord, which is then allowed to glide inwards — without removing the index finger which then touches the outer border of the tendon. Upon the nail of the index finger one places the back of the tenotome, which is then pushed into the tissues to the depth desired, and one incises the tendons from without inwards, avoiding puncture of the skin on the inner side with the instrument. One afterwards sees carefully to the arrest of any bleeding, and also to abduction in order to arrive at the hyper-correction (abduction of from 35° to 40° at least).

Correction in the two cases is kept up by a very firm and well modelled plaster apparatus. The compression made to produce hæmostasis should be prolonged with the greatest care until the plaster sets. This compression is necessary in order to avoid sub-cutaneous



Fig. 456. — Where osteotomy may be performed. — 1 Cervical, or rather cervico-trochanteric, osteotomy (the most useful). 2. Trochanteric (also recommended). 3. Sub-trochanteric (generally done, but wrong).

hæmatomata which might become infected in course of time.

B. — THE CORRECTION OF ANKYLOSES BY OSTEOTOMY

I have said (p. 406), that you will scarcely ever have to make a section of the bone, because real hip disease is hardly ever followed by osseous ankylosis. I myself do not make more than one or two osteotomies a year although I always have several hundreds of cases of hip disease under treatment.

Osteotomy will be **sub-cutaneous** for the same reason that



Fig. 459. — Ordinary osteotome.

tenotomy is, because sub-cutaneous interferences are less harmful and offer less risk of infection than those which are done by the open method. The osteotomy severs two thirds or three fourths of the thickness of the bone, and one finishes the section



Fig. 457.

Fig. 457. — Cervico-trochanteric osteotomy. Bad transverse direction of the osteotome, which would penetrate into the pelvis.



Fig. 458

Fig. 458. — Good direction; — should be nearly vertical in some cases.

by an osteoclasia, which renders the interference quite harmless.

WHERE SHOULD THE BONE BE DIVIDED?

From the orthopædic point of view, it ought to be done at the level of the angle of the bend (fig. 456).

But because of the situation of the old morbid focus which may not, strictly speaking, be entirely defunct, it is better that the rupture should be made a little outside that point.



Fig. 460. — Osteotomy. — 2nd stage. — Position of the patient. In this figure 460 the handle of the osteotome is held too high. Its direction must follow (as in fig. 462) the axis of the diaphysis.

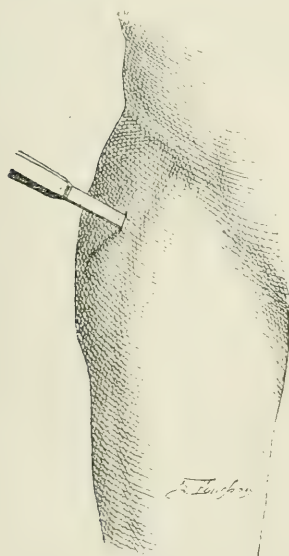


Fig. 461. — Osteotomy. — 1st stage. — The osteotome is introduced into the cutaneous incision down to the bone at the junction of the trochanter and the neck. Then the osteotome is turned 90 degrees (Fig. 460. See also Fig. 1115 and 1116).

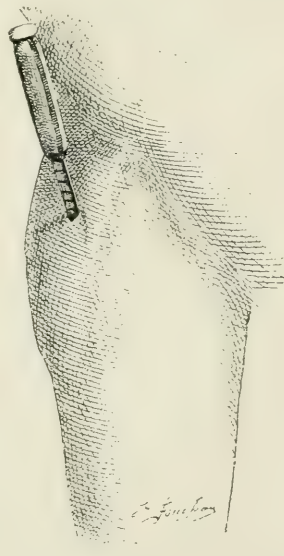


Fig. 462. — Osteotomy. — 3rd stage. — The direction of the osteotome is then changed; it should correspond to a bisection of the angle formed by the femoral diaphysis and the bicotylian axis.

It will therefore not be made close to the iliac bone — you would be too near the old focus — but at **the most external part of the neck.** In any case do not go

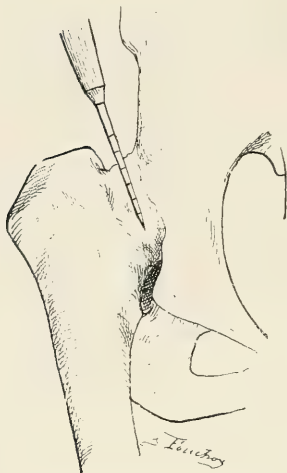


Fig. 463. — Carry the instrument quite near the trochanter, further outside than is shewn in this figure. The osteotome is driven by a few strokes of the mallet, making a section of two-thirds or three quarters of the bone.

below the middle of the great trochanter (fig. 456, 1 or 2) because you would then be too far from the angle of the bend and the gain by your operation would be much lessened from the point of view of lengthening of the limb; it is for that reason we condemn subtrochanteric osteotomy which is recommended in some works; it is somewhat easier, it is true, but it is distinctly less advantageous. In order to meet the case, you may approach the bone at **one or one and a half centimetre below the superior border** of the great trochanter (fig. 456, 1 and 2).

The section should not be transverse — one would run the risk of penetrating the iliac bone — it should sometimes be almost vertical (fig. 458).

— It will have practically the direction of a bisection¹ of the angle formed by the diaphysis of the femur and the axis of the acetabulum (fig. 458 to 463).

Then, by prolonged pressure, ensure hæmostasis, and fix the limb in hyper-correction (fig. 465). The after-treatment is the same as for simple redressment. One leaves on the large plaster for six months, then one makes the child get up with a small apparatus — which will not be dispensed with for a year and a half later, when the position will be permanently preserved.

1. This indication is sufficient for practice, because one has never to do with adductions of less than 45 degrees (in osseous ankylosis). But the indication would no longer be reliable for an extreme adduction, say of 80 degrees, for instance; it would be necessary in that case to perform subtrochanteric osteotomy.



Fig. 464. — Osteotomy (continued). The section of the bone being made for two-thirds or three-quarters, one removes the osteotome and **finishes with an osteoclasis**. To do this, the thigh is carried very firmly into flexion and adduction as if one wished to **exaggerate the existing deformity** (this is the first stage of the final osteoclasis).

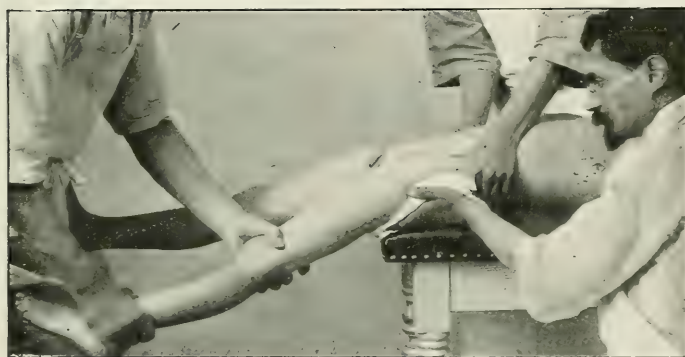


Fig. 465. — Afterwards (2nd stage) the thigh is carried into the corrected position, that is, into hyper-extension and forced abduction.

Osteoclasis.

Although it is, in reality, a little more traumatising and a little less precise than osteotomy, manual osteoclasis may be of service for children whose parents do not wish at any price to hear one

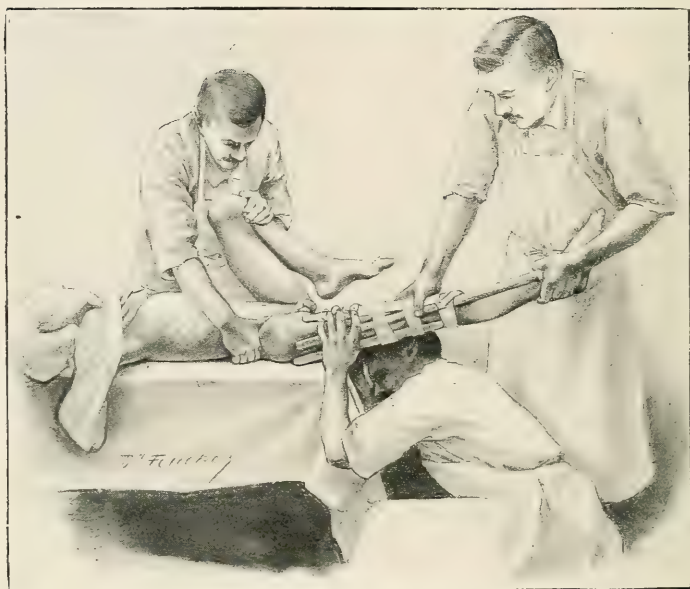


Fig. 466. — Osteoclasis. — An assistant holds the pelvis (or better, 2 or even 3 assistants firmly fix the pelvis). The operator seizes the limb (previously straightened by means of splints tightly strapped); another assistant seizes the thigh as near as possible to the root, and both of them, the operator and the last assistant, push the thigh downwards and outwards until the bone is broken.

speak of osteotomy, nor of blood, nor of a hole in the skin. I have performed it under these conditions without accident, with an excellent final result. Nevertheless, I do not advise you to have recourse to it except in case where the X rays have demonstrated a neck very much weakened and atrophied — or when you have found, under chloroform, a few obscure movements, but not marked enough to justify an ordinary redressment.

In these two cases, you have every chance of breaking the bone at the neck or very near the angle.

In order to be successful, you will strengthen the femoral



Fig. 467. — **Right luxation.** 1st position **after the reduction** (see p. 462). To be quite sure of immobilisation, the sound thigh has been plastered as well.



Fig. 468. — 2nd stage. The left leg (sound) is still in a plaster collar.

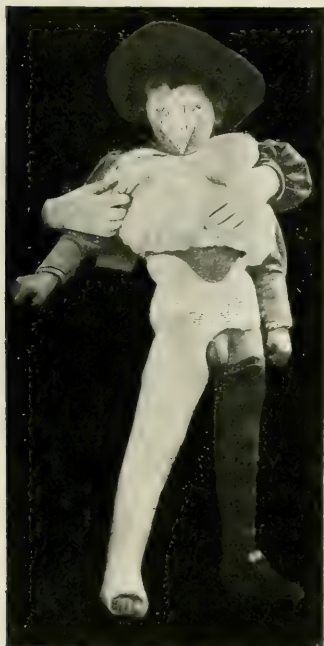


Fig. 469. — 3rd stage (large plaster).



Fig. 470. — 4th stage. The child can walk.

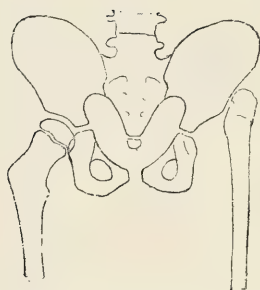


Fig. 471. — Luxation of right hip joint. Radiogram on Sept. 2nd, 1901.

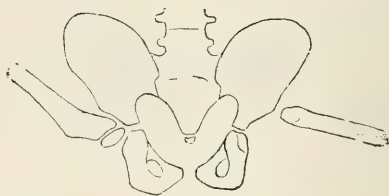


Fig. 472. — Sept. 23rd, 1901. One tries to reduce by an abduction of nearly 90 degrees, but without success.

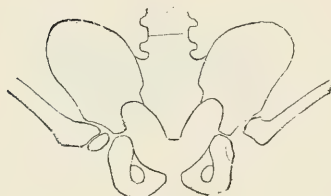


Fig. 473. — Sept. 23rd, 1901. In order to induce the femur to enter the acetabulum, it was necessary to place the thigh in **flexion at an acute angle** on the abdomen, and in abduction of about sixty degrees.

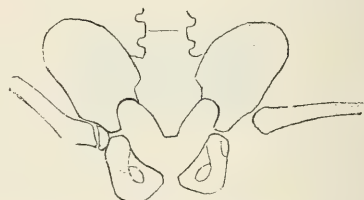


Fig. 474. — Oct. 28th, 1901. A month later, one attempts to lessen the flexion and abduction. The radiogram allows one to see that the femur has a tendency to escape from its cavity.

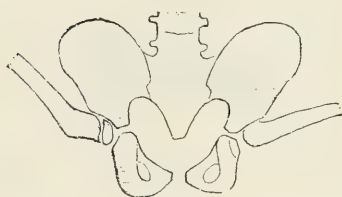


Fig. 475. — Oct. 28th, 1901. Seeing this, one immediately replaces it in the old position of abduction and flexion; the radiogram shews that, once more, reduction is accomplished.

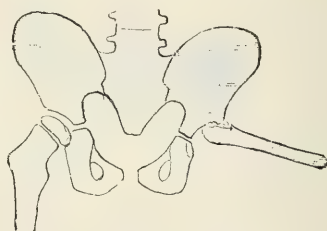


Fig. 476. — Dec. 23rd, 1901. New attempt to put the femur in abduction of 90 degrees. This time the reduction is maintained. One sees that a small bridge of bone has been produced between the edge of the cavity and the femur.

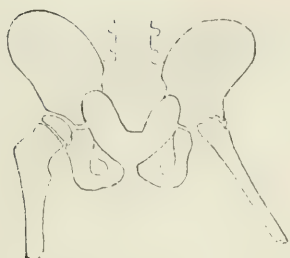


Fig. 477. — May 6th, 1902. The femur has been replaced in position, little by little, in several stages. The reduction is permanently maintained.

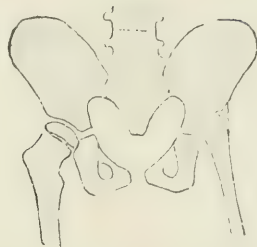


Fig. 478. — June 22nd, 1902. Abduction of about 20 degrees. The reduction is maintained. The small bridge of bone has a tendency to grow. The child walks easily.

diaphysis by means of four wooden splints held by straps tightly fixed; a veritable apparatus of Scultet (v. fig. 466).

1st. STAGE¹. — One puts the wooden splints in position.

2nd. STAGE, — While two or three assistants hold the pelvis, pressure is made on the middle of the thigh, until the bone is broken.

4th. CASE. — **The Treatment of Luxations of the Femur.**

I said, on p. 408, that if the head of the femur is in good condition, *which is very rare*, one makes the reduction as in a congenital luxation of the hip (v. Chap. XIV).

But if the head of the femur is destroyed (*which is the usual condition*), one may then place the trochanter in the bottom of the acetabulum. — One must be guided here, at every step, by the indications afforded by radiography. — The treatment is difficult and it is reserved almost exclusively for specialists. It is illustrated here (fig. 467 to 478).

5th. CASE — **The Treatment of Abscess in Hip Disease**

The treatment by puncture and injection is the only rational one.

We have explained the technique at length at the commencement of this work, in Chapter III.

Here are some indications relating particularly to the treatment of abscess in hip joint disease.

1. After being certain that ankylosis is complete,

A few precautions to be taken according to the situation of the abscess.

When the abscess is at a distance from the vessels, there is nothing in particular to notice; but when the abscess is situated either in front, in the region of the femoral vessels, or above the crural arch, in the pelvis, there are some special points to consider.



Fig. 479. — Puncture on the outside of the vessels. The operator isolates the vessel with one hand, whilst he punctures with the other hand.

a. BELOW THE CRURAL ARCH. (fig. 479).

First palpate the femoral artery which you can feel pulsating; on the inner side of the artery is found the vein, for which you will allow a centimetre and a half. You will examine where you ought to approach the abscess, whether it is outside the artery or inside the vein. That depends on the facility with which pressure by the fingers makes the purulent collection bulge more strongly and more distinctly, on the outer side or the inner side (fig. 480 and following).

When you have decided where the puncture is to be made,



Fig. 480. — Small abscess in front of the femoral vein. — Fig. 481. The abscess is pushed inwards by pressure of the finger. The needle, directed inwards, against the dorsal aspect of the finger, runs no risk of touching the vein.

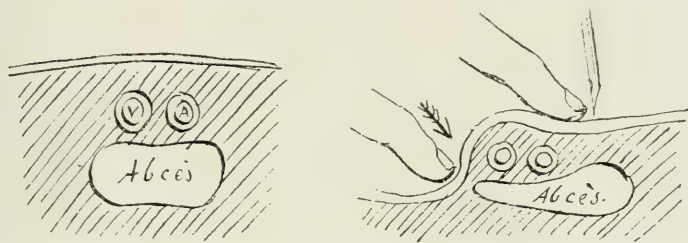


Fig. 482. — 1^{re}. An abscess situated behind the vessels. — Fig. 483. — 2^{de}. A finger firmly presses the skin on the inner side of the vein in the direction of the arrow. The abscess is made to bulge on the outer side of the artery, which is protected with a finger during the puncture.

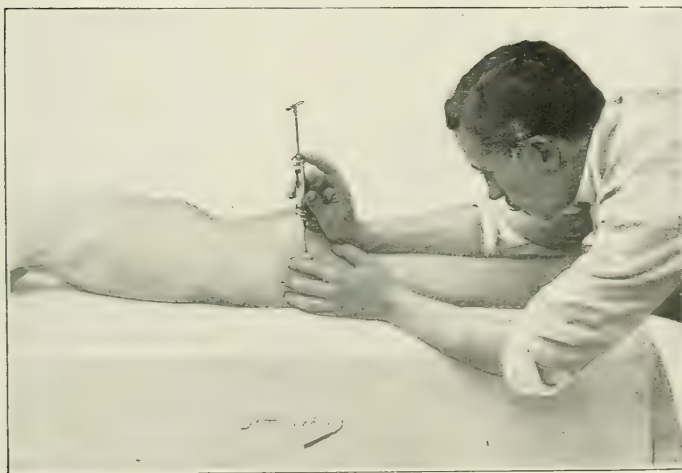


Fig. 484. — Abscess of the buttock. — It is easy to avoid the sciatic nerve which is situated at an equal distance from the trochanter and the ischium.

internally or externally, your assistant attempts to pass his finger under the vessels, on the side opposite to that you are going to puncture, and he will push the collection towards you; it

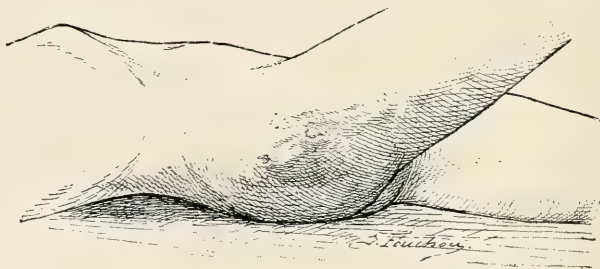


Fig. 485. — Multiple fistulae (see following figures).

becomes, by this manœuvre, more easily accessible. You avoid in this way wounding the vessels (fig. 480 to 483).

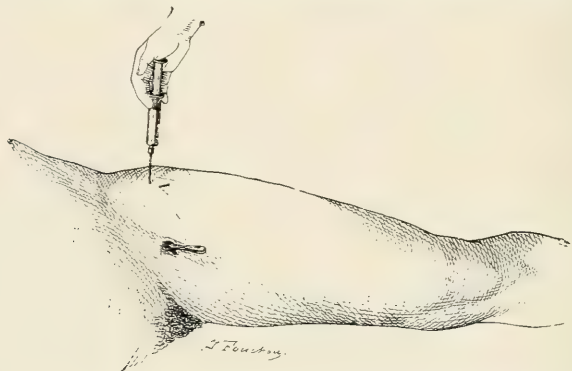


Fig. 486. — Injection into the fistulous tracks by the **posterior route**. The modifying liquid, injected through A into the articular cavity returns by the fistulous orifices which one blocks with a large tampon. One has followed here the external route in order to penetrate into the joint instead of the anterior route indicated on p. 393. — But one may follow also the anterior route.

Suppose, however, you do wound them : at once, a jet of blood issues through the needle; withdraw it immediately and place your finger over the orifice, pressing for a moment, then, as in dressing a phlebotomy of the arm (it is in fact the same

thing) apply a tampon of cotton wool over the bleeding point with some turns of Velpeau bandage. The slightly compressive dressing will be removed after five or six days; after which you will recommence your punctures, going a little further away from the vessels, either inwards or outwards.

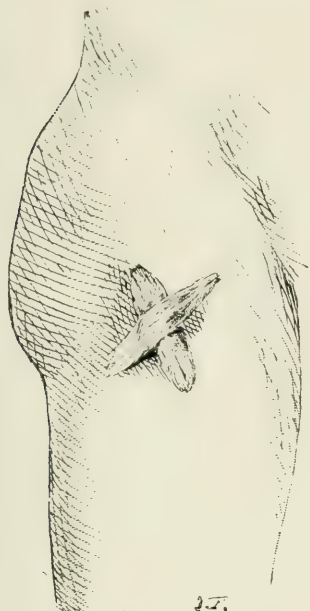


Fig. 487. — Dressing after injection.
1st. Two tampons are placed crosswise over the fistula to keep it closed.



Fig. 488. — 2nd. An assistant keeps hold of the tampons whilst the bandage is applied. This will assure the obliteration of the fistula from one injection to the other.

b. ABOVE THE CRURAL ARCH.

An assistant causes the purulent collection to bulge more strongly by pressure exerted from above on the internal iliac fossa. You keep close to the crural arch with your needle, to be sure you avoid the peritoneum, and you keep to the outside of the vessels or inside of them, as the case may be (v. also fig. 319 to 322).

c. BEHIND THE THIGH (fig. 484).

You will avoid the sciatic nerve by remembering that it passes obviously at an equal distance from the trochanter and the ischium.

6th CASE. — **Treatment of a Fistula in Hip Disease.**

The treatment should be suggested by that described

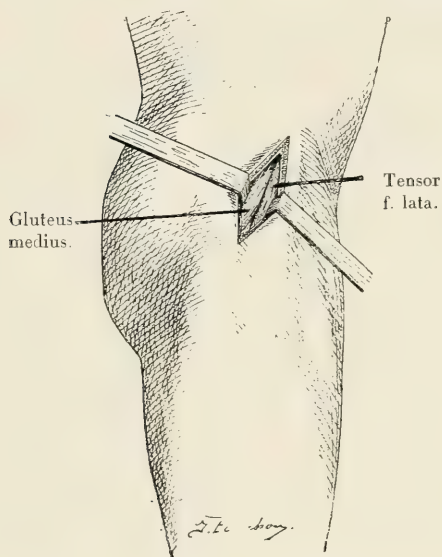


Fig. 489. — Sketch of the incision, either for drainage of the joint, or for resection. One sees, at the bottom of the wound the space which separates the Gluteus Medius from the Tensor Fasciae.

(Chap. III and V) for fistulae in general, and for the fistulae of Pott's disease (v. fig. 485 to 488). — But here, in the hip joint, one may do more.

Drainage, Arthrotomy and Resection of the Hip Joint.

We have mentioned (p. 381) the respective indications for these.

Drainage is effected, as everywhere else, by means of incisions made at all the points where one suspects there is pus retained.

Arthrotomy, or the simple opening of a joint, is performed as in the

four first stages of resection of the hip joint and is terminated by a thorough drainage.

We will proceed to explain the technique of resection.

Resection of the Hip joint¹ (fig. 489 to 495).

1st STEP. — *Incision of the skin* along a line running from the anterior superior iliac spine to the antero-superior angle of the

1. The indications for which are so exceptional, as you will not have forgotten (v. p. 381).

trochanter, exceeding by two centimetres in each direction these two extreme points.

2nd STEP. — *Find the interval between the tensor fasciæ and the gluteus medius and separate their two edges.* If the interval

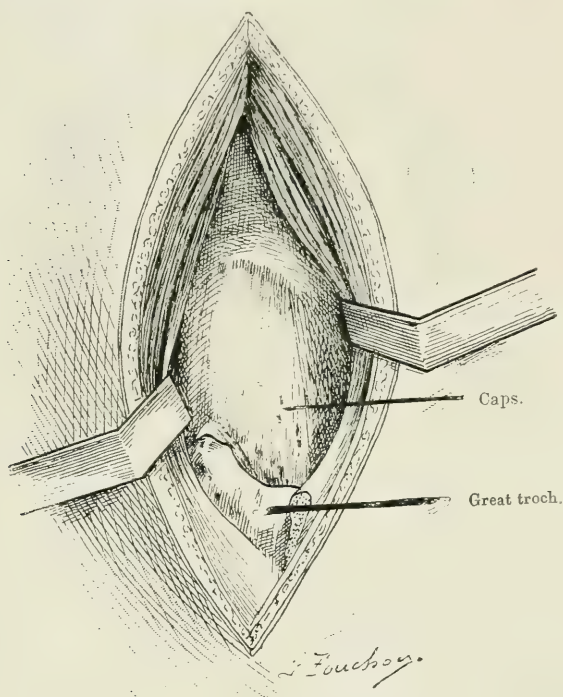


Fig. 490. — One finds one's way through the interspace and sees the capsule of the joint.

is not recognizable, which is the case in old standing suppurations about the hip-joint, cut in the direction of the cutaneous incision, through the lardaceous tissues, down to the capsule.

3rd STEP. — *Exposure of the capsule, or of what still remains of it.*

4th STEP. — *Opening of the capsule by a crucial incision.* — The head of the femur appears.

5th STEP. — *One raises the head without dislocating the femur.* If the head is completely necrosed or in a soft condition, as is

frequently the case in hip-joint disease, one removes it entirely with a curette, and lays bare the acetabulum. If the head of the femur is not necrosed nor softened, one removes (with the chisel, forced in by the hand or the mallet) only the upper

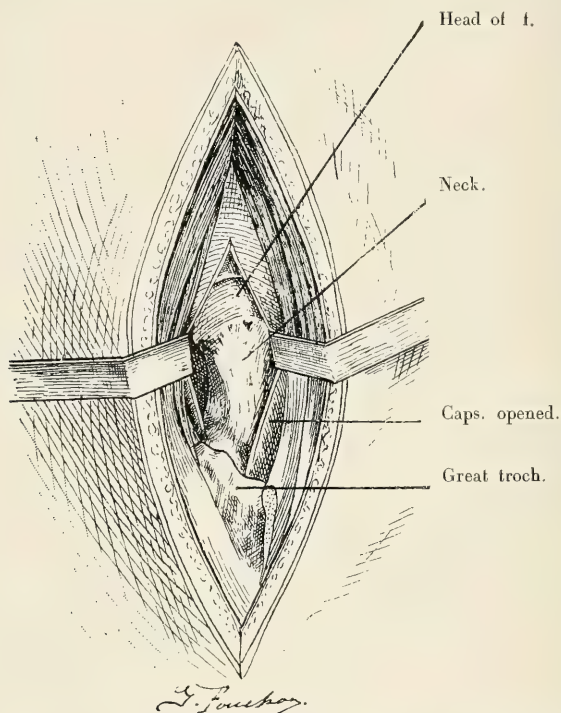


Fig. 491. — Arthrotomy. The capsule of the joint is opened in its entire length and allows the head and neck of the femur to be seen.

half of the head and neck, to ensure the discharge of the pus; we will find the half remaining extremely useful from an orthopædic point of view for preventing ulterior luxations.

6th STEP. — *One makes the toilet with a curette, then with gauze, with which one rubs out the cotyloid cavity and neighbouring parts in order to remove all debris. Then one ensures hæmostasis.*

I ought to make special mention of the **arrest of hæmorrhage**

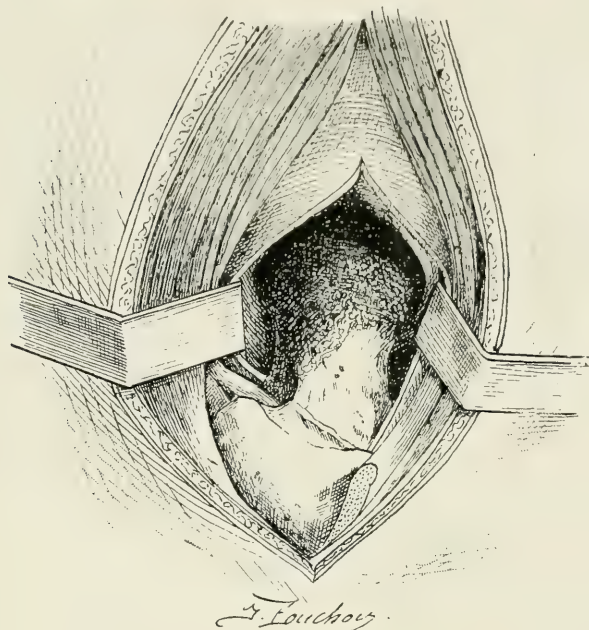


Fig. 492. — The upper part of the head and neck have been scraped which is sometimes sufficient to ensure the drainage of the cavity.

during or after the operation. You should see to this at every step.

It is necessary to proceed quickly, — that is understood. But there is one thing of more importance than going quickly (the *tuto* before the *cito*) : it is **to see that the patient does not lose blood**, or loses as little as possible.

For this, at each step of the operation, one secures the small vessels which may have been

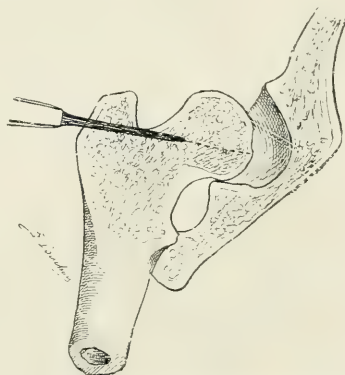


Fig. 493. — Resection of upper half of the trochanter, of the head and neck, by means of a cold chisel pushed in by the hand.

opened. As to the oozing from the surfaces of the soft parts and the bone, one meets that with **tampons** and with **firm pressure** upon the parts for one, two, three, four, five minutes, until no more blood flows. Then, one proceeds a step further, one compresses again, and so on.

If you have been careful to prevent bleeding, the shock of

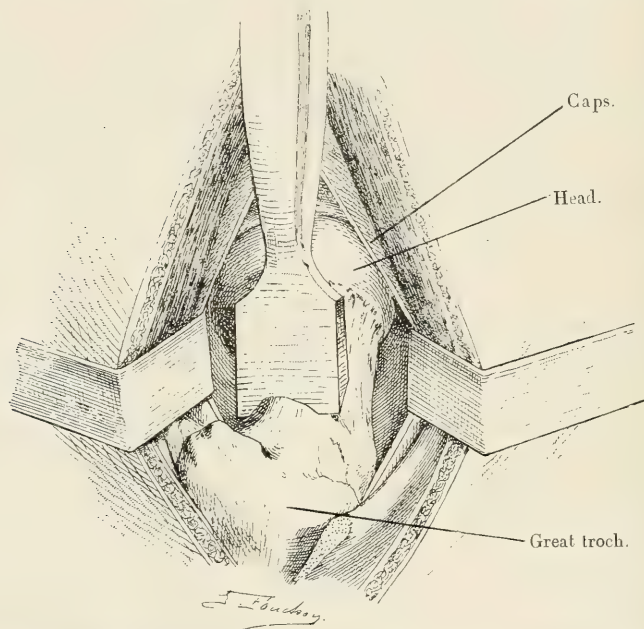


Fig. 494. — Complete ablation of the head and neck. — A cold chisel, worked by hand, divides the neck near its base and nearly perpendicularly to its own axis.

the operation will be almost nil, even in an operation of half or three quarters of an hour; on the contrary, the shock will be grave, even after a short operation, if you have not controlled the bleeding well.

At the end of the operation, one makes a permanent arrest of hæmorrhage by pads placed in the bottom of the acetabulum and by **energetic pressure**, which one keeps up for

from **10 to 12 minutes** before proceeding to the dressing.

One or two large drainage tubes are inserted into the joint, and, if there is room, into the hole in the roof of the cotyloid cavity, enlarged if necessary; and one arranges round the drainage tube several tampons of cotton wool for twenty four hours. One sutures the two extremities of the wound.

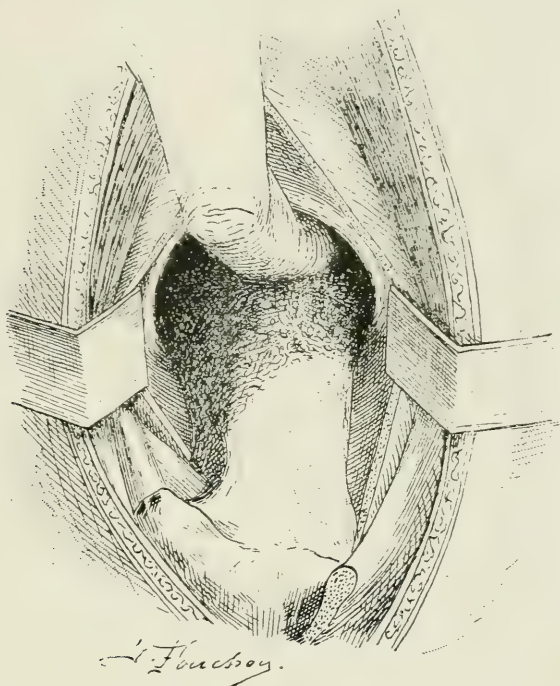


Fig. 495. — Exploration of the cotyloid cavity after abrasion of the head.

7th STEP. — *The apparatus.* — One constructs over the dressing a *large plaster*, with the limb in a position of extension and slight abduction.

The next day, one cuts out a square opening opposite to the region of the operation, following as a guide the line of the incision, and one removes the tampons, having previously mois-

tened them with oxygenated water. From that time onwards the dressings are changed through the opening in the plaster.

The **technique** of resection **varies** a little if it is done for one of those cases of **hip-disease which go on indefinitely** in the form of dry caries (v. 6th case) because there one looks

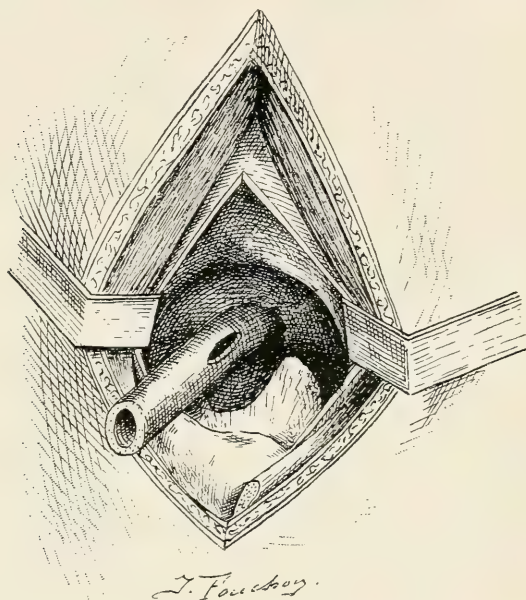


Fig. 496. — Drainage after abrasion of the head and part of the neck of the femur. The drain passes into the perforation in the roof of the acetabulum.

for a complete and immediate cure of the disease, that is, union by first intention.

In this case, proceed as in resection of the knee joint for white-swelling not opened. Guard with more care than ever against any defect in asepsis. Remove by abrasion all the suspected points of the two osseous extremities and of the surrounding soft tissues.

With regard to the bones, however, endeavour to reconcile the necessity of removing all the diseased portions with the

desirable preservation of a portion of the head, or at least of the neck, sufficient to provide a solid support for the limb on a level with the acetabulum.

One touches the osseous surfaces with a strong solution of phenol (one to ten for instance) and, for ten minutes, apply pads with very energetic pressure on the osseous surfaces in order to ensure hæmostasis before closing the wound.

You will not close it completely but will insert two small drains at the two extremities of the wound to prevent the formation of a hæmatoma, which so easily becomes infected. The drains are removed at the sixth or eighth day.

CONVALESCENCE AFTER HIP-DISEASE

When do you place the child on his feet?

As a general rule, when the tuberculous focus is cured.

One may consider it as cured 6 or 10 months after the disappearance of the clinical manifestations: fungosities, softening and pain, either spontaneous or on pressure.

Then¹ the child is placed on his feet; at the beginning, with the support of two crutches (or, better still, held by the hands) then of two sticks (fig. 497), then of a single stick or rather of a **walking stick held on the side opposite the affected hip.**



Fig. 497. — The sticks which advantageously take the place of crutches during convalescence after hip disease.

1. From this time, he is permitted to sit up in bed for 1 or 2 hours a day; — 4 to 6 months later, he will be able to sit in an ordinary chair to take his meals (without the apparatus).

He will do his walking exercises from ten o'clock in the morning till six o'clock in the evening.

He will walk 5 minutes every 2 hours for the first 2 months¹, 5 minutes an hour for another 2 months, then 10 minutes an

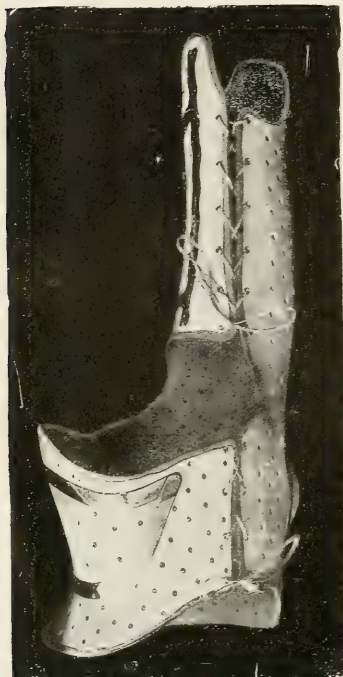


Fig. 498. — The small apparatus in celluloid padded and furnished with an armature of steel. Anterior aspect.

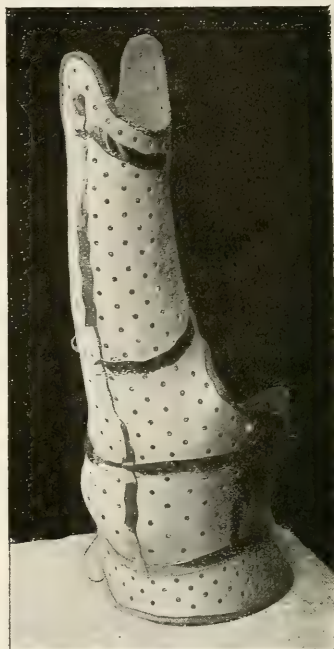


Fig. 499. — The same. Posterior aspect.

hour the 4 months following, after which he will have returned to the normal regime.

Apparatus for convalescence.

1st CASE. — If the hip has **preserved** the whole, or the greater part of its **movements** a removable apparatus in

1. In the interval of these exercises, the child will rest on a frame or on a couch.

celluloid is worn by the patient when **he makes his first attempt at walking**. The apparatus will be the small one stopping at the knee (fig. 498, 499). — or, better, the large apparatus reaching to the foot, but jointed at the knee



Fig. 500. — The large apparatus in celluloid jointed at the knee and ankle.
Anterior aspect.

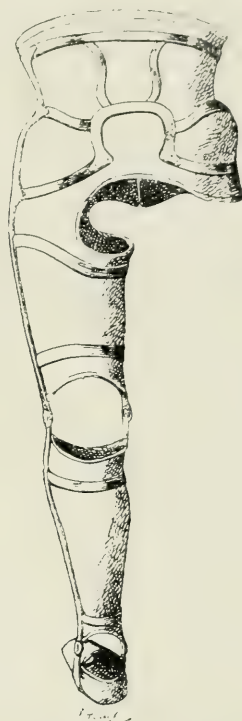


Fig. 501. — The same.
Posterior aspect.

and ankle (fig. 500, 501). — The patient will wear it only from 10 a. m. to 6. p. m. His hip will be free all the rest of the time as well as during the night.

6 to 10 months later, one will commence to massage the legs gently, electrise them, bathe them; and one teaches the patient to walk properly, methodically, “ thinking out ” each step.

After a year, all apparatus may be put away.

2nd CASE. — If the patient has a **stiff hip** with a **tendency to deviation**, he must wear the apparatus constantly.

It should be a **small** irremovable plaster, or a large celluloid reaching from the umbilicus to the foot, jointed at the knee and at the ankle.

For how long is the apparatus to be worn?

You will leave on the apparatus **until the hip has no tendency to deviate**, which result is often not attained until 2 years or even longer, after **standing-up** has been first allowed.

When you judge that the time has arrived to leave off the apparatus, you leave it off gradually, first at night, then part of the day, and you will verify very exactly every 8 days that there has been no movement, that is, that there is no return of adduction of the knee nor lumbar hollowing. If you perceive the least deviation, replace the apparatus or, at least, ensure during the night, by the help of Velpeau bandages, attitudes contrary to those which the limb has a tendency to assume.

You will combat adduction, flexion, rotation, in the way mentioned in chap. xiv (fig. 850 to 854).

And even in the case where nothing has yielded, apply slight extension during the night, as a preventive measure, so that the limb keeps the attitude and the length you wish it to retain. Coxalgic children have need, after the cure of the tuberculosis, of being looked after by the surgeon for one or even several years, without which they very often again become gradually deformed. You have cured a child without deviation, with no lameness or nearly none; the parents think it is no longer necessary for you to see him, and then, after one, two or three years, a deviation of the hip and a marked shortening have recurred, causing a very unsightly lameness.

Do not give up these children because they have given you up too soon. Put them back under treatment and redress the deviation, in the way we have directed for vicious ankyloses in cured hip cases (v. p. 447).

This unfortunate eventuality will not occur if you remember to urge the parents to shew the child to you after the



Fig. 502. — To take the measurements for a special heel. The patient is placed upright. The iliac spines at the same level; one places some plaster under the sole of the foot which does not touch the ground.



Fig. 503. — The foot resting on the special heel is covered with a stocking, the mould is made over the whole; one sees the band of zinc over which will be made the incision to take off the negative mould.



Fig. 504. — Foot for the affected side. Foot provided with special heel.



Fig. 505. — Sound side.

apparatus has been left off, at least every 3 or 4 months for several years.

Orthopædic Boots.

A shortening will often remain¹, in spite of everything².

If that amounts to less than 2 c. m. it is negligible; the child will walk well, without even the need of a raised boot (provided the position is good and the hip well united). But if the shortening attains or exceeds 3 c.m. supply a special heel, not equal to the height of the total shortening, but only half that. The boot should be supple to preserve the easy movements of the foot.

Relapses and recurrences³.

In stating the precautions to take and the care to be given to patients just allowed to stand again and during convalescence, we have implicitly indicated the best means of avoiding relapses, that is the return of the tuberculosis.

We ought to add some precautions of a general nature, meaning by that, that one must not be in a hurry to send back a child to Paris or to any great city, or to the poor surroundings where he was taken ill.

One must keep him by the sea or in the country, and attend to his diet and to his hygiene.

Keep him from every possible contagion.

How many cases of cured hip disease have broken down when prematurely sent back to Paris!

Do not forget that cured hip disease is an old tuberculosis and the subject of it ought, on this account, to follow a severe course of hygiene, for several years more.

Thanks to good supervision, one will avoid relapse, or at least one will render it as rare as is humanly possible; for one must admit that a **debilitating malady** which has unfortunately appeared a short time after the cure, — influenza, diphtheria,

1. Particularly in hip disease with abscess, the tuberculosis having, in these more serious cases, deeply eroded and sometimes destroyed the head of the femur and the roof of the acetabulum.

2. Unless you have made early articular injections.

3. What we say here of recurrences in hip disease is applicable to recurrences of other osteo-articular tuberculosis.

mumps, etc. or a violent **traumatism** over the hip, may precipitate a relapse, whatever may have been done up to this moment.

Parents ought to flee from all foci of contagion and preserve their children with the greatest care from all kinds of shocks.

What to do in the presence of a patient with hip-disease cured for one or two years, **who suffers again** in the region of the joint?

Assure yourself first of all that it is a question here of a true relapse and not of some passing pains due to a **simple sprain** — coxalgiques assuredly being liable (as much or even more than anyone else) to a sprain of the hip after a blow or some exaggerated fatigue — not leading inevitably to a return of the tuberculosis.

In case of doubt, always place the child at rest for two weeks. If all pain disappears the same day, replace the child on his feet after those two weeks and send him back again to his ordinary life, but little by little, watching over him very closely, of course.

On the other hand, if the pains reappear as soon as he is placed on his feet, or if, at the outset, he has been taken with acute pains, muscular contractures in the whole of the region, or with nocturnal pains, or again, if there exist fungosities appreciable on palpation, you will conclude he has a **true relapse** and will submit the child to the same treatment he underwent at his first attack.

Let us mention that the appearance without any pain, of a periarticular **abscess**, two, three, four years after the child has been sent back to normal life, is **not always the sign** of a **relapse** of osteo-arthritis. It is a question very often of an old erratic bacillary nodule, of a fungosity of the soft parts, having lost for a long time all communication with the hip, which could have been reabsorbed and remained permanently ignored, and which, instead of that, has softened and produced the abscess of which we speak. In a word, it is an idiopathic abscess of the soft tissues, rather than an abscess by gravitation coming from the joint. You will puncture it and inject it, and you will be able to send back the child almost immediately (after a month or two) to his ordinary life.

APPENDIX TO CHAPTER III

On our results in hip disease.

1st. Specimen of the result usually obtained in cases of recent hip disease (v. figs. 506 and 507).

The case here illustrated is that of a little boy, Pierre R... of Paris, whom we treated at Berck for a left coxitis of between two and three months standing.



Fig. 506. — Child cured of left hip-disease, Pierre R... of Paris who was sent to Berck by my master, M. Jalaguier.



Fig. 507. — The same. One sees that he has recovered the whole of his movements. He is able to flex his thigh at an acute angle.

These two photographs were taken three years after cure.

The diagnosis had been made by my master, M. Jalaguier, who had even commenced the treatment in Paris, before sending the child to Berck.

At Berck, the little patient followed the treatment given in this book for hip disease of the first variety. At the end of 14 months, he was allowed to get up and begin to walk. Here are the photographs taken three years later.

The first shews that the child is quite straight (fig. 506). No hollowing, no deformity, no shortening. The second shows that he has recovered the whole of his movements.

After that, one will not be surprised that the child walks to-day without a shadow of a lameness. He is a normal child. And similar results are not the exception, they are the rule in hip disease taken at the beginning and well treated. We can recall a good number of our old cases of hip disease who have been able to go through their military service.

2ND. **Specimen** of the **results** obtained in **old** or **grave** cases of **hip disease**.

The four figures (508 to 510) represent a boy of 13 years of age (A. de N. of Lisbon) who came to us at Berck in 1899, with a left hip joint disease of malignant character dating from about 4 years and still in active progress; the child complained of very severe pains and presented two large abscesses, one on the buttock, the other in the middle part of the thigh, but not yet opened, fortunately. There was impossibility of movement without crutches, on account of the pain, and of a very marked deviation of the affected thigh, which was flexed at nearly a right angle¹, with adduction and internal rotation.

General condition very indifferent, child pale and miserable.

Treatment. — Complete repose in the recumbent position, on a frame. We commenced by treating the abscesses — punctures and injections — without taking notice of the hip joint disease. At the end of three months, the abscesses were dried up and at the same time the general condition was greatly improved. At that moment we commenced orthopœdic treatment, that is, the correction of the vicious ankylosis, proceeding gently, without chloroform, and by stages, in the following way: the trunk of the child being held by two assistants, we made slight traction of about 10 or 15 kilograms, on the foot and the leg and after 2 or 3 minutes of this traction, having obtained from 10 to 15° of correction, we stopped there. Handing over the traction to an assistant, we plas-

1. If the thigh appears, in figure 508, much less flexed, it is because the lumbar hollow is not obliterated, but the flexion attained 80° or 90° when one had taken the precaution of obliterating the lumbar arch (v. p. 484, fig. 508).

tered the child in this slightly corrected position (large plaster going from the umbilicus to the toes).

A fortnight later, a second correction (again without chloroform) of 10° to 15° , and a second plaster, and so on; every two weeks a new short sitting for correction, — always gentle, so as not



Fig. 5o8. — Left hip disease dating back four years, of grave character, and still in active progress. Severe pains, two abscesses, vicious ankylosis. The child unable to move. Such was the condition of child on arrival at Berck.



Fig. 5o8 bis. — The same child three years later (the abscess has been dried up and the deviation obliterated in several sittings, by stages). See the text for details of treatment.

to fatigue at all the child who bore these very small interferences admirably.

At the end of three months, three fourths of the correction was obtained. To complete the correction we preferred to have recourse to chloroform and perform a tenotomy on the adductors. This very small operation, which lasted barely 5 minutes, gave us not only the complete correction, but even a hyper-correction of from 35° to

40°. This time, we left the plaster in position for four months. Then a new large plaster for three months, with a smaller abduction (25 to 30). After that a final plaster, which stopped at the knee, in an abduction of 20° only. For one year more, the child wore small plasters: and then for nearly eight months a celluloid



Fig. 509. — The same child seen in profile (on his arrival at Berck).



Fig. 510. — The same, three years after our treatment. Observe the straightening. The good attitude has been maintained for the last seven years.

apparatus, which makes a duration of about three years for the whole of the treatment. But look at the result obtained.

The child walks actually without apparent lameness, and this slowly obtained cure has been perfectly maintained for the last seven years.

One can, with a treatment well conceived and well carried out obtain results in every way as satisfactory in the immense majority of cases of grave and far advanced hip disease.

CHAPTER VII

WHITE-SWELLINGS

I. — *Diagnosis of tuberculous arthritis at the onset.*

We do not speak of the disease when the diagnosis obtrudes itself, but at the commencement of the disease.

You are consulted about a patient who experiences in one of his limbs a fatigue, or a pain (the pain sometimes only at night), or even a single functional inconvenience, which may be only intermittent. Never neglect to examine completely nude in such cases, the regions of the joints of the suspected member, comparing them constantly with the same regions on the opposite side. — Find out :

1st. If there exist **pain on pressure** of the articular extremities in the segment over which the patient or his friends draw your attention (fig. 511).

2nd. If there exist already a commencing deviation, and in default of an apparent deviation, a **limitation**, however slight, **of the movements** of this articulation.

With these two signs you will be able to assert that **there is "something wrong"** in the joint (fig. 512, 513, 514, 515).

How will you know that this "something" is tuberculous?

1st. **By the history.** If the pain and loss of power have supervened without appreciable cause, without a distinct injury, without rheumatism, without blennorrhagia, without the antecedents of scarlatina or of hereditary syphilis, you should think of a tuberculous

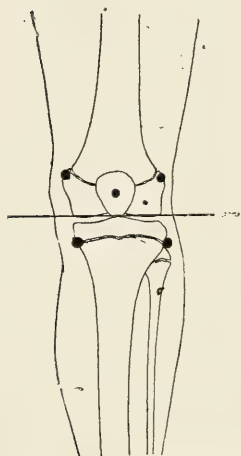


Fig. 511. — White swelling of the knee. — Look for pain. The painful points (on pressure with the index finger) may be found either opposite the epiphysal cartilages or over the interline.

arthritis, especially if you are dealing with a delicate child, or one



Fig. 512. — *Limitation of movements* — The patient lying on his face. On the right affected side, flexion of the knee is very limited; on the left sound side flexion is normal.

recovering from a debilitating disease, an eruptive fever, measles, whooping cough, etc.



Fig. 513.

Fig. 513. — *Limitation of movement*. — A normal knee joint. — Complete extension is possible.



Fig. 514.

Fig. 514. — A diseased knee joint. — Complete extension is impossible, it remains at a slight degree of flexion.



Fig. 515.

Fig. 515. — Front view. — Globular knee. One notes at the same time a slight degree of genu valgum.

2nd. By the *direct signs*. If the patient has no fever (or scar-

cely a few tenths of a degree); if, on palpation of the accessible parts of the synovial membrane, you find thickenings (fig. 516, 517), irregular bulgings of the serous cavity, a pasty consistence or pseudo-fluctuation; if there exist an atrophy of the muscles contrasting with thickening of the folded skin (fig. 342, p. 360).

3rd. **By the positive ophthalmic-reaction**, the value of which seems to me to be real without being pathognomonic.

In the cases where you still have some doubt, have the courage



Fig. 516. — Normal knee. The osseous prominences and the muscles in relief (normal condition).



Fig. 517. — Diseased knee. The osseous and muscular prominences have disappeared owing to swelling of the knee.

to **reserve your diagnosis**; ask to see the patient again; meanwhile, keep him under observation.

If you think there is a possible sprain, massage it; — if rheumatism, prescribe salicylate of soda; — if simple hydrarthrosis, puncture it and apply pressure; if hereditary syphilis, adopt the specific treatment.

When, in spite of these different treatments the symptoms still persist for several weeks, namely, pain on pressure over the ends of the bones, limitation of movements, functional distress, thickening of

the synovial membrane, — then conclude that there is a tuberculous arthritis and commence the treatment appropriate to that condition.

H. — Prognosis of white swelling according to the varieties and according to the treatment.

1st. **Will it be cured?** — Yes; if the patient lives by the sea, or in the country, and if you do not open or allow to be opened, the tuberculous focus in the joint.

2nd. **How will it be cured?** — It is always possible to preserve, or to give back to the patient, a limb in good position, — strong and useful.

As to the movements, that is another matter; they depend on the joint, on the gravity of the disease, on the age of the patient, and not only on the treatment adopted. We shall see, in studying white swellings in particular (v. p. 510), what you can safely promise as to mobility in each variety of the condition.

3rd. **When will it be cured?** — This depends chiefly upon the treatment adopted. In a year, with the intra-articular injections; in 3, 4, 5, or 6 years, with the conservative treatment without injection; in 3 or 4 months, with a very successful resection. So much for a closed white swelling (with or without effusion). But, if it happens to be a fistulous white swelling, it is impossible to be precise as to the duration of the disease (perhaps however one may be permitted to say a year and a half on an average with the conservative treatment here indicated and in surroundings such as those of Berck). (See the observations on white swellings with fistulæ cured, in our “*Traité des tumeurs blanches*”, Masson, éditeur, 1906.)

TREATMENT OF WHITE-SWELLINGS

1st PARTIE : GENERALITIES APPLICABLE TO ALL WHITE SWELLINGS.

We ought to make a distinction between the orthopædic treatment and the treatment of the tuberculous focus.

A. — ORTHOPÆDIC TREATMENT.

1st. WHITE SWELLING BENIGN AND RECENT.

(Little or no fungosity, without pain and **without deviation**.) In the *hospital*, and for children of the working class, you will at once apply a plaster (a circular plaster extending to the neighbouring articulations).

For *town children*, you may equally well use a plaster; nevertheless it is better, **in these cases** and in **this class** of people, where you **always look for a cure with mobility of the joint**, not to apply a plaster, provided the joint affected is kept at rest.

Prohibition of walking and rest in the sitting position with the leg stretched out, if the lower limb is affected.

The arm in a sling with liberty to walk about, if the upper limb is concerned.

The joint in both cases protected with a light protective dressing (cotton wool and Velpeau bandages).

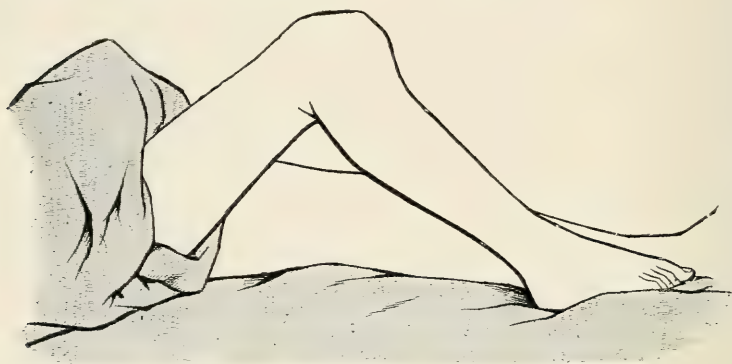


Fig. 518. — White swelling of right knee with marked deviation.

2nd WHITE SWELLING DISTINCTLY FUNGOUS OR PAINFUL.

Here, in the town as in the hospital, you will immediately apply a plaster which *will include both the neighbouring joints*, so as to ensure more certainly the immobility of the affected joint.

3rd WHITE SWELLING WITH DEVIATION (fig. 518).

The indication is to correct the deviation: then to preserve the correction with a large plaster.

Be prompted by what we have already said (v. Hip joint disease, chap. VI) as to redressment of tuberculous deviations.

We ought, as in Hip disease, to distinguish between **two varieties of vicious attitudes**.

1st : **Those at the onset** or during the acute period of the

disease when the tuberculosis is most virulent, and **demand**s the greatest precautions.

2nd: The vicious attitudes *nearly always* *painless*, **at the end** or at the "relapsing" period, when the tuberculosis is nearly extinct or even quite extinct. Here **manipulations** of a **vigorous** kind are **permissible**.



Fig. 519.

Fig. 520.

Fig. 521.

Fig. 522.

Fig. 519-522. — Correction of a deviation of the knee by successive stages.

a. 1st METHOD. — *Without chloroform. Redressment by stages.*

A new plaster every fortnight.

One gains a few degrees each time, without causing pain, as it only amounts to a little traction or a little pressure, which can be effected even after the last plastered strip has been applied.

You appeal to the courage of reasonable patients who will tell you freely how far you may go with traction without arousing real pain.

One attains in this way, in the space of two or three months, surprising corrections and even complete ones, without making any change in the patient's mode of life.

Figs. 519 to 522 represent the correction by stages, made by a series of plaster apparatus, without Chloroform.

b. 2nd METHOD. — Correction with the help of Chloroform.

An apparatus every 15 days, in the way we have just described, is however too much under certain circumstances, for instance in a hospital, for a very busy surgeon. It is simpler, for example, little as one may be familiar with anaesthesia, to give a few drops of chloroform and finish at one or two sittings at the most.

Indeed, by the help of chloroform, one accomplishes almost immediately, without danger, without violence, the desired correction which is at once secured by the application of a plastered apparatus. The whole affair occupies from 5 to 10 minutes and then three months of rest and perfect comfort is assured for the patient.

One sitting suffices for recent vicious deviations. The older deviations require generally two or sometimes three. A general rule, which it is important not to forget, is to avoid all useless or violent manipulation.

We may add that correction is always attained — or nearly always — by simple orthopædic manipulations, by a simple redressment without having recourse to an osteotomy or even to a tenotomy.

B. — TREATMENT OF THE TUBERCULOUS FOCUS.

What shall we do to cure the tuberculous focus?

A treatment consisting of rest of the joint and its immobilisation by a plaster apparatus.

Is that all?

It is all when one is dealing with a focus in Pott's disease. But if, in Pott's disease without perceptible abscess, the seat being too far removed from the lesions prevents us doing more, it does not follow that our attitude will be the same in articulations so easily accessible as the knee, the foot, the shoulder, the elbow or the wrist¹.

1. From this point of view, Hip disease stands half way between Pott's disease and white swellings of the different joints. The hip is not so easily

Here we may choose between the three¹ following treatments :

1st. Mere *rest* in a *plaster* ;

2nd. Removal of the articular focus, that is *resection* ;

3rd. Modifying intra articular *injections*.

Of these three treatments which is the best?

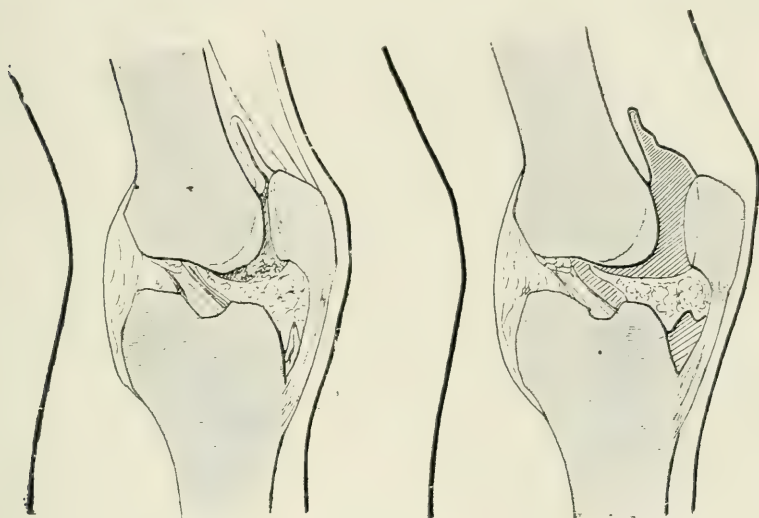


Fig. 523.

(see description of Fig. 527).

Fig. 524.

To reply to this question, let us go back to the tuberculous type of lesion, which is Cold Abscess.

In fact, is not **white swelling**, in reality, merely a **cold abscess of the articulation?** (fig. 523 to 527.)

It is evident, if it is a question of white swelling with discharge. But it is also true of white swelling not yet softened ;

accessible ; nevertheless you have seen that it can be reached by following the method given on page 392.

1. **The method of de Bier in white swellings?** I do not know this method well enough to be able to express a definite opinion.

But what I can say is that, in some cases well known to me where it has been applied for **tuberculous arthritis**, it has produced an unmistakable **aggravation**. Even amputation has been necessary in three cases treated by it ; these patients would certainly have been cured by the treatment we advise.

if here the liquid contents of a cold abscess are wanting, on the other hand, we have it's virtual cavity and especially it's characteristic element, the only essential one of the cold abscess, namely, the proliferating and fungous wall.

It follows that what has been known to be good for cold abscess will without doubt be good for accessible white swell-

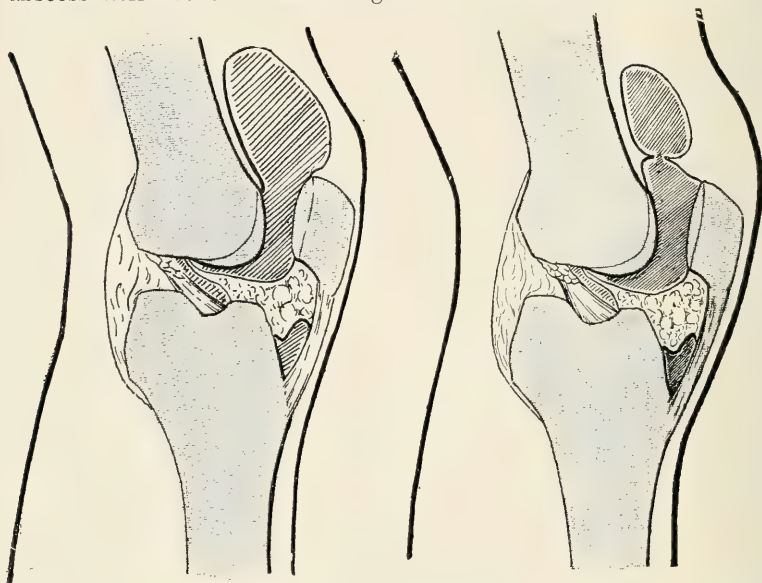


Fig. 525.

(see description of Fig. 527).

Fig. 526.

lings. And, if there is one thing universally admitted in cases of cold abscesses, it is the beneficent revolution which has taken place in their treatment since one *punctures and injects* them; it is the **indisputable superiority of punctures and injections over pure conservative treatment** (rest and compression) — which is *too uncertain and too long* — and **over surgical operation** which *rarely cures, often aggravates* (by leaving a fistula) and *always mutilates*¹ (fig. 528).

1. If it is true when one operates on cold abscess, what is to be said of the mutilation left by resections in childhood? They inevitably leave a lesion of the articular cartilages, whence a shortening which will increase later on.

It is exactly the same in white swellings, where the treatment by punctures and injections is infinitely superior to the two others; it is efficacious, benign, easy to use everywhere and relatively rapid; it cures in a few months, 8 to 12, leaving

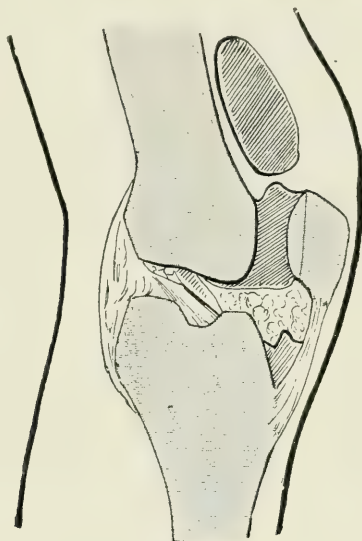


Fig. 527. — Description of figures 523 to 527. — *Analogy of suppurated white swellings with cold abscess*: the figures allow us to realize that the synovial membrane (the cul-de-sac under the triceps) may become separated from the rest of the articular cavity (pathological adhesions) and form an abscess. The abscess is cured, like all cold abscesses, by punctures and injections. The articular pocket will be cured logically by the same method (as it is of identical nature with the part which has been separated from it).

superior orthopædic results to those of the two other methods¹.

I do not say that there do not exist some cases of dry or On this account typical resections ought to be condemned without appeal, in childhood.

1. Injections, by advancing the date of cure, allow us to considerably shorten the period of severe immobilisation in plaster; and thus the movements have not time to be lost, or, if lost, they may return, — whilst surgeons who do not make injections are obliged to leave the plaster for three long years, whence for their patients, the habitual termination by ankylosis, even after mild arthritis.

fungous white swellings calling for either conservative treatment (recent or mild arthritis not fungating, the child not pressed for time and able to wait for years) or resection (white swelling of knee completely and easily accessible in an adult working man to whom time means money). **But apart from these special exceptional indications**, to which we will

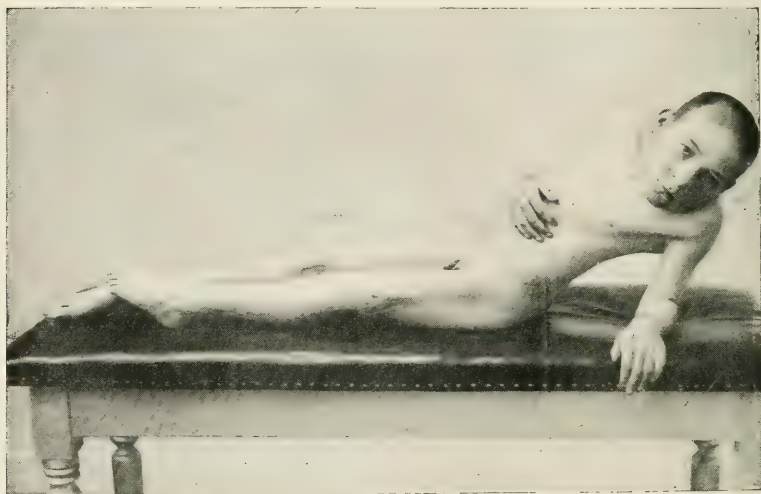


Fig. 528. — An example of the poor result of a resection of the knee : after 5 years, there is a shortening of 11 cm (!) as well as a pseudarthrosis.

return, the treatment by **injections** ought to be the **regular treatment** of tuberculous arthritis.

The method of cure of white swellings *with effusion*, by the method of injection, is easy to comprehend; but *how can injections cure a dry or fungating white swelling?*

In this way : By making the injections into the large articular cavity and not round about it, we reach the fungosities on the internal surface of the synovial membrane and over the osseous surfaces, that is, where they really are.

The liquid, placed in contact with the fungosities, modi-

fies them in two ways, either sclerosing them or softening them.

Be the transformation fibrous or liquifying the cure will be thus promoted, hastened, assured; if there is solution, that is to say intra-articular effusion artificially brought about, one associates the punctures with the injections, as in the case where effusion existed before.

We have liquids which give us sclerosis : that which gives the best result is creosoted oil with iodoform (the formula is given at p. 115); — others which give us solution of the fungosities, the best is emulsion of camphorated naphtol in glycerine (1/6 camphorated naphtol to 5/6 glycerine; see page 115, the dose to be injected).

I call those which produce **sclerosis**, *injections of the dry type* : when they bring about **liquefaction** — *injections of the liquid type*. In a general way, it is better to dissolve than to sclerose.

One cures better and more certainly by dissolving all the tuberculous products, so as to be able to expel them afterwards by puncture, than by transforming them *in situ* by sclerosis. Bacteriology allowed us to foresee this; clinical work has demonstrated it. One will make then, — as a general rule, — injections of **camphorated naphtol** in glycerine rather than injections of creosoted oil with iodoform. It is a necessity in the **forms**, even slightly **grave**, of articular tuberculosis.

As to the **benign forms**, the **injections of creosoted oil with iodoform may be sufficient**, and, as they cause, as one can imagine, less inflammatory reaction than the other, one may give **injections of the dry type** in **all town children** with nervous parents. One cures three fourths of the cases in this way. When the worst comes to the worst in those who after 5 or 6 months are not cured, you will make a second series of injections, this time of the liquid type.

To recapitulate, when white swellings are dry or suppurating, the treatment by injections, if it is well done, cures more than 19 out of 20 of the patients in the space of from 8 to

12 months, with, very often, the preservation of the functions of the joints.

This preservation of mobility is obtained especially in town patients whom we are able to follow up and who come to us before the period of osseous destruction has set in.

STATISTICS

To give you an idea of the results of injections in tuberculous arthritis, we cannot do better than place before you here the entire statistics of white swellings treated for 10 years, from¹ January 1895 to January 1905, in the hospital Cazin at Berck, where all white swellings without exception are treated by intra-articular injections.

The number of these white swellings amounted to 311 (176 of the knee, 77 of the ankle, 18 of other articulations of the foot, 8 of shoulders, 15 of elbows, 17 of the wrist or other articulations of the hand.)

All these children were cured within a year, by a series of 12 injections, except 7 of them who were cured after 2 or 3 years only, and in whom a new series of injections had to be made (even a third series in four of them). There existed undoubtedly several independent foci which had not all been reached by the first series of injections.

Not one death, no amputation, nor even a real resection. We have not performed in that hospital, for the last ten years, more than three resections of the knee *with a purely orthopaedic object in view*.

These children have been cured, as we said, in an average of 8 or 12 months, namely, 2 months for the injections, 3 months of compression and rest after the injections, and finally, from 4 to 6 months supervision, still at rest, to be assured of the cure, before returning to the use of the limb.

From the point of view of quality of result, not only have we obtained limbs of normal length, position and strength, but, in nine tenths of these cases, the mobility is preserved, but not however in the knee; we must admit that in the hospitals we do nothing to preserve suppleness of the knee, because children of the working

1. These statistics of the hospital Cazin are the most striking of all those I am able to quote :

1st. Because in the hospital Cazin, *all* the swellings have been treated by injection.

2nd. Because the method has been followed with the utmost strictness.

class, with little or no supervision afterwards, have more need for the time being of a strong limb which remains well cured, than a supple joint, which, on account of its very suppleness, is exposed to sprains and relapses.

It happens also very often, after a year and a half or two years of waiting, that mobility in the knee returns of its own accord.

TECHNIQUE OF TREATMENT OF WHITE SWELLINGS
BY INTRA-ARTICULAR INJECTIONS.

a. — **White swellings with effusion.**

Here is the scheme of treatment you should carry out. You apply a plaster, with an opening for the injections. After that the treatment is identical with that of ordinary cold abscess (v. Chap. III. *Treatment of suppurated tubercloses*); the same liquids in the same doses, are injected into the articular cavity. (You will find in the second part of this chapter, the place for injecting each articulations.)

Thus one makes from 7 to 8 punctures with as many injections at the rate of one every 6 or 8 days — which extends over about two months.

After that, you make methodical pressure over the region with squares of cotton wool introduced through the opening in the plaster and supported by a soft bandage, a compression equal to that required for a gibbosity (v. Chap. v). You leave the limb at rest in the plaster apparatus for three or four months longer. The examination made three or four months later shews that the articulation is free from pain¹.

From this time, the joint is left without apparatus; but it still requires rest for several months (rest, for the lower limb on a frame; in a sling for the upper limb). It is during these few

1. If, very unusually, three or four months after the injections, pain and fungosities still persist, it would be necessary for you to make a second, and if need be, a third series of injections, leaving three or four months interval between the series. This necessity for the second series of injections has occurred to us 3 times in a hundred, and that of a third series once in a hundred only.

months of rest that you usually see the movements return *spontaneously* by the sole effect of the joint being left at liberty and without any direct treatment; at the most you will help it by a few baths (2 or 3 every week).

You should not consider the child cured before six or seven months after the articular extremities have been freed from pain on pressure.

This makes for the entire treatment, on an average, from 8 to 12 months.

TUBERCULOUS HYDRARTHROSIS.

If instead of pus in the joint there is only a sero-fibrinous effusion (do not forget that half of the hydrarthroses of childhood, in particular those which continue beyond a few weeks, are of tuberculous nature), one will carry out the same treatment as for distinctly purulent effusions, with this difference, that five or six punctures and injections, followed by two punctures without injections, suffice generally in the case of hydrarthrosis, to ensure the cure.

b. — Dry white swelling.

One applies here also a fenestrated plaster for 5 or 6 months. We know that here we may look for either sclerosis, or solution of the fungosities.

Not only the liquids, but also the number of sittings and their intervals are different in the two cases.

1st TO OBTAIN SCLEROSIS, one injects from 2 to 12 grammes, according to the age of the subject and the capacity of the joint, of creosoted oil with iodoform, and one will make only one injection weekly (without punctures, seeing there is nothing to evacuate). One ceases after eight or ten injections.

2nd TO EFFECT THE LIQUEFACTION OF THE FUNGOSITIES, one injects the mixture of naphthol and glycerine¹ (v. p. 165),

1. **Alone, camphorated naphthol** may not **give** us this **liquefaction** with certainty. — Gaiacol, or thymol or camphorated salol are of **incompa-**

giving *an injection* daily until the articular effusion is brought about.

That is produced towards the fourth day (sometimes on the third, sometimes only on the fifth or sixth).

As soon as the liquid appears, one commences with a puncture and finishes with an injection, following the technique already studied for white swellings with effusion existing at the onset.

From this time, spread out the sittings; one only every five or six days, which gives the patient a rest, the daily injections at the beginning being fatiguing to him.

The treatment following the injections is the same as that given above.

The reaction caused by the injections.

Injections always cause a certain fatigue and a certain reaction; that is true even with iodoform. You should warn the parents of this. The reaction is more noticeable with injections of naphthol, especially at the commencement, where they have to be repeated each day in order to produce the articular effusion.

It is not a question of an immediate reaction, which with our liquid is next to nothing, but of the **desired reaction**, the following day and for some days afterwards, which is shown by the general and local phenomena of an acute or subacute inflammation. One observes a certain malaise, loss of appetite,

rably less value (I have experimented with them, also, for a long time).

But camphorated naphthol needs to be employed with considerable caution, that is, in a certain dose and in a fixed form.

The dose is from 6 to 30 drops for each injection according as you are treating a child or an adult.

The form in which it should be used : **never alone**, always intimately mixed with glycerine in the proportion of one gramme of camphorated naphthol to five grammes of glycerine. Refer to page 125 and to figure 107.

Under this form and in this dose, **camphorated naphthol** is not only **inoffensive** but is just as **efficacious** as pure camphorated naphthol. — that is, it produces on the fourth or fifth day the articular effusion sought for.

(See the thesis of Dr H. Saint-Beat, 1905.)

sleeplessness, at the same time slight swelling, pain and heat, and occasionally some redness of the neighbourhood of the joint. The temperature reaches 38° , $38^{\circ}5$, and even sometimes 39° , with the doses we have mentioned.

If then after the first or second injection, the temperature rises, it is a good sign, in this sense, that it marks the very near occurrence of effusion in the joint.

The pain and other symptoms however should not exceed a certain limit, and the temperature must not remain at say, 39° , beyond a few days.

It is **easy** besides, to **moderate the reaction** when too violent; it suffices to suspend the injections for one or several days, or even to inject only half doses of the liquid.

Here is the right formula : provoke sufficient reaction to obtain the articular effusion, but not enough to cause excessive fatigue to the patient. One keeps it at the desired degree, about 38° , by increasing or diminishing the dose of liquid injected, or by spreading out the injections or lessening the intervals between them.

The period of malaise comes to an end when the effusion is brought about, more especially as, from that moment, the object being gained, one can widen the intervals between the sittings.

c. — **Injections in white swellings with fistulæ.**

The rule here is the same as in the case of tuberculous fistulæ in general (v. p. 170 and 217).

It is only in non-infected fistulæ that one makes modifying **injections** (of camphorated naphthol with glycerine or creosoted oil with iodoform). One makes one injection daily for 10 days; then pressure and rest for three or four weeks. If this series does not suffice for a cure, recommence in the manner described at pages 173 and 180.

CHOICE OF TREATMENT ACCORDING TO THE CLINICAL VARIETY OF WHITE SWELLINGS

1ST CASE. — DRY OR FUNGATING WHITE SWELLINGS (WITHOUT EFFUSION)

We said that intra-articular injections are our usual treatment for white swellings; this in the treatment we apply always, and from the beginning, in hospital practice. In town work we do not adopt it, neither always nor from the beginning, for reasons which you will easily understand. There are timorous parents, who are afraid, instinctively, without knowing why. One must reckon upon their opposition.

As moreover, it is indisputable that a tuberculous arthritis has many chances of being cured without injections, in a good environment, although the treatment may be five or six times longer, it is true, you may after having warned the parents of this fact, keep to the purely conservative treatment, without intra-articular injections.

Leave the child at rest, as in the first case of hip-joint disease, on a frame, without a plaster, with a simple cotton wool dressing. He lives by the sea or at least in the country for 2 or 3 years. We said that the parents are in no hurry.

As long as the joint is not plastered, there is no fear of ankylosis, or of too great atrophy of the limb.

After a few months of this regime, if the joint has become practically painless on pressure, if there are no more fungosities, if the position is still correct, we may expect a cure and we will continue the same treatment.

But if the white swelling is stationary and, still more, if it has progressed, if fungosities, pains, or a deviation have appeared, there is proof that a cure will not be obtained without injections, or, at least, that it will not happen for long years. The duty of the surgeon is then to insist again, with the parents, so that they agree to allow the use of modifying

injections. Tell them that the injections will : 1st, ensure and hasten the cure, 2nd, yield a better cure than the conservative treatment would do in a similar case.

This point settled, here is, recapitulated in a few words, the course to be followed in cases of dry or fungating white swellings.

The three following clinical varieties must be distinguished :



Fig. 529. — Diseased knee joint. — Swelling of the joint. — The patella appears projected in front.



Fig. 530. — Healthy knee joint seen on its external surface.

a **White swellings benign and recent.**

Practically no fungosities, no deviation, no spontaneous pains (fig. 529, 530).

When treating a town patient. — If the parents are unwilling to have the injections given, place the joint at rest, with or without plaster, and wait.

If **you have entire liberty of action**, make, from the outset, **injections of creosoted oil with iodoform** after having put on a plaster to be kept on as long as the injections are made, and for a few weeks afterwards.

If you see, after three or four months of waiting, that this is not sufficient, if fungosities or pain on pressure persist, make injections of camphorated naphtol.

*When you are treating a hospital patient, inject **camphorated naphtol** with glycerine from the outset (after the application of a plaster).*

*b. **Fungating and grave white swellings** with or without deviations, and*

*c. **Old and painful white swellings**, already several years old and mistaken for chronic rheumatism :*

For these two varieties (*b.* and *c.*); from the arrival of the patient, plaster apparatus, after correction of vicious position, if he has one; then, the next day or the day afterwards, **injections of camphorated naphtol**.

In these old white swellings, consisting probably of multiple independent foci, one must make similar and simultaneous injections at every point where a tuberculous focus is supposed to exist, and make, if need be, a second and a third series, at three or four months interval the one from the other.

It must be understood, however, that in dealing with an adult workman, always in a great hurry, and if you are a surgeon and very certain of your asepsis, you may at the outset, suggest resection¹, because it would be a saving of time to the patient.

If you are not a surgeon, you may, even in this case, keep to the treatment by injections of the liquid type, repeated if necessary. They will succeed in the end, nine times out of ten, and the orthopaedic cure so often obtained will be at least equal to that which resection would give, — at the cost of a little patience and time, it is true (a year or a year and a half instead of from three to five months), without any risk to the patient; this cannot be said of resection, which very often

1. Or better, after a series of injections (5 or 6, made in the space of a month), which will much attenuate the virulence of the tuberculosis and will ensure union by first intention.

leaves fistulæ, in which case the situation would be very noticeably aggravated by operation.

2nd CASE. — **WHITE SWELLINGS WITH EFFUSION,
PURULENT OR SERO-FIBRINOUS
(TUBERCULOUS HYDRARTHROSIS)** (fig. 531).

Always and everywhere, in town or in hospital, in adult or in child, there is only **one rational treatment** : plaster, punctures and injections, either with creosoted oil and iodoform, or, with camphorated naphthol and glycerine (v. p. 115).

3rd CASE. — **WHITE SWELLINGS WITH FISTULÆ**

Read again what we have said (chap. VI) on fistulæ in hip-joint disease.

The treatment differs according as the fistulæ are infected or not (v. for this difference, p. 225).

In **non-infected fistulæ**, you will make injections and the cure will be obtained, generally, in a few months.

In **infected fistulæ**, **no modifying injections** of iodoform or of camphorated naphthol are made.

At the most you will try syringing with solution of permanganate of potash or with very weak carbolised water.

You must confine yourself to a discreet therapeutics, simple asepsis, and good general treatment : you will need abundant patience, for the cure requires 1, 2 or 3 years. But at last the cure is obtained, at least in an ideal environment such as that of Berck.

So much for the case where there is no fever, or not much.

But it is not sufficient where there is fever.

You will have to drain, to overcome it.

If the fever persist in spite of drainage, in spite of arthrotomy (that is, an extensive opening of the articular cavity and removal of any sequestra you may find) and, in spite of resection ; or again, if the viscera, liver or kidneys, show the first

signs of degeneration, owing to infection extending from the peripheral focus; or if the patient is cachectic and the lungs are beginning to be tuberculosed, resign yourself to sacrificing the limb. This is a last resource which we do not have in hip joint disease. But you must not have recourse to it except as a last extremity, that is, when you are *morally certain that the life of the patient is in immediate danger and can not be saved without amputation of the limb*¹.

Nevertheless, amputation is sometimes proposed outside the preceding indications, and in the case of a working man whom the necessities of life oblige to return to the unwholesome surroundings of a large town.

His fistula, more or less infected, without for the present endangering his life, has not, nevertheless, much chance of being cured, and causes far too much risk of bringing about in the long run a generalisation of the tuberculosis. It would be better then to amputate.

If the lower limb is in question, one would not even attempt, as a preliminary, a very large resection, which would only cure the patient with a limb so shortened that it would be of less use to him than a good stump².



Fig. 531. — White swelling with effusion. — The knee is very swollen; no osseous reliefs are apparent; fluctuation quite distinct.

1. And on the other hand, to be morally certain that amputation will save him, that is, that the intervention is not too late.

2. At Berck, I do not perform, on an average, one amputation a year, amongst many scores of fistulous white swellings in children or adults,

4th. CASE. — **WHITE SWELLINGS CURED OR APPARENTLY
CURED WITH ANKYLOSIS**

Your course, in the presence of an ankylosis, will differ according as it is accompanied with a deviation or not.

Leave it alone if there is no deviation, or rather you will only deal with the ankylosis by very slight methods : very gentle massages; the Baths of Bareges, Bourbonne, Aix, Dax, Salies, or Argelès-Gazost¹.

On the other hand, if there is a **deviation** and the functions of the limb are seriously affected, you must **correct it**.

No surgical operation for this, not even a tenotomy; but **correction** by simple **orthopædic** movements with or without chloroform; by stages, one correction every five days, each partial correction being followed by the application of a plaster; 3 or 4 sittings suffice. By this method you will succeed, because the ankylosis is hardly ever really complete, that is, osseous.

Never, or scarcely ever, will you need to perform osteotomy², nor orthopædic resection.

As for me, I do not perform one per year on an average, although I redress annually a hundred ankyloses following white swellings. As soon as you have transformed the ankylosis with deviation into an **ankylosis in good position**, you will leave it alone and **do nothing to mobilise it**³.

whom I treat altogether; but the patients are not all able to come to Berck, nor wait two years for their cure. This means that you may be obliged, more often than the Doctors of Berck, to perform the painful task of amputating.

1. See "Argelès-Gazost from a medical point of view" by my old assistant, Dr Bergugnat.

2. Osteotomy, should it ever seem indispensable to you, is easily and simply performed. See chap. x. as to how it is done at the knee, the supra-condylar osteotomy of Mac Ewen.

3. Doubtless, it is very different for a specialist quite familiar with these therapeutics, and practising in an orthopædic institution which is furnished with all the installations desirable (balneo-therapy, electro-therapy,

There would be too few chances of restoring movement and too much risk of losing the good position of the limb in endeavouring to do this.

The cure of white swelling is achieved in good position. The patient will then have a very useful limb.

Be satisfied with this very honourable result, and take care not to spoil it, from the functional point of view, or even to re-awaken the disease in trying to restore the articular suppleness which has been lost.

If I endeavour to warn you, in the course of this book, of all that you can and ought to do, I endeavour also to point out that which you cannot, that which you ought not dare to do.

mecano-therapy, etc.). Here one can have recourse not only to massage, but, in certain well understood cases, to the mobilisation, discreet and prudent, active or passive, of stiffened joints.

Passive movements are sometimes effected by mathematically regulated machines, such as our arthromoteur, or by the hands of the doctor. Occasionally even, in certain infinitely rare cases, one practises forced mobilisation of the ankylosis under chloroform, to bring back movements; after this the limb is immobilised for 1 or 2 weeks; then the mobility thus educed from the joint is developed by massage and passive manœuvres.

But these treatments are so special in nature, their results call for so much time and care, they have so few chances of success in the hands of the majority of practitioners, that I do not hesitate to formally advise you not to attempt them.

II

SECOND PART OF CHAPTER VII, OR THE TREATMENT OF EACH WHITE SWELLING IN PARTICULAR

What we have said in the first part of this chapter is applicable to all the white swellings.

We must now pass in review the white swellings of different joints, in order to point out the peculiarities which each of them presents.

WHITE SWELLINGS OF THE KNEE ¹

White swelling of the knee is the most frequent of them all. It is the type of the white swelling, that which we have especially in view in our clinical and general therapeutic study of white swellings. We will add only a few things here.

Ist. *From the point of view of* **Diagnosis** (fig. 532 to 539).

a) I have no need to teach you how to find, by looking for the patellar " choc ", the existence of *effusion*.

b) It is here especially that we have to distinguish *simple hydrarthrosis* from *tuberculous hydrarthrosis*.

If the *hyarthrosis* continues for more than 6 or 8 weeks, in spite of puncture and pressure, it is, nearly always, *symp-tomatic* of a tuberculous arthritis.

In the presence of a double hydrarthrosis, without limitation of movements, one ought to think of *syphilis*, if there are

1. See the thesis of : Dr Dulac, 1898; Dr Ch. Benoit, 1906; Dr Cresson, of St-Petersbourg, 1905.

any antecedents, and even when in doubt, follow the specific treatment (v. chap. xxi, *Syphilis of the skeleton*).

c) In adolescents and in adults, an arthritis of the knee,

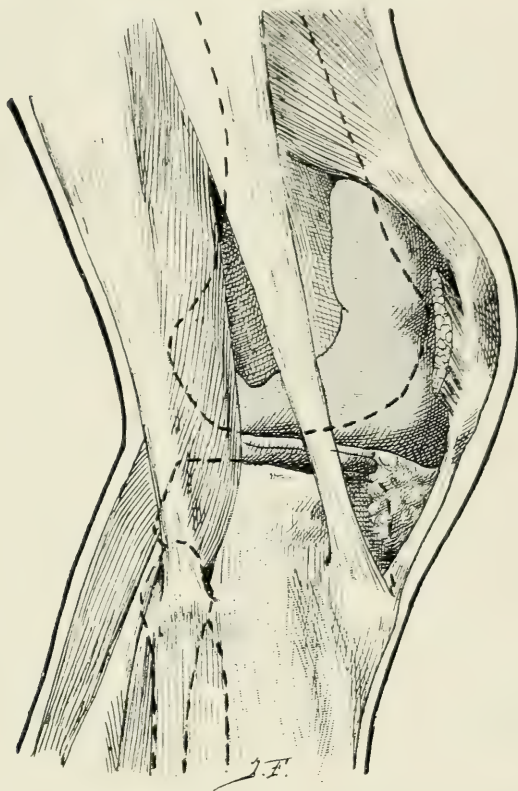


Fig. 532 — To search for fungosities. — Schema of the anatomy of the synovial membrane, which is seen tinted in grey behind the patella.

which has appeared without apparent cause, is probably due to a *blennorrhagia* and one ought always to examine the patient with this in view.

2nd. As to **Prognosis**.

Refer to what we said at page 489 on this subject.

One can restore a leg straight, strong, and useful, to these patients, but not always the movements.

One must note that this mobility is much more difficult to obtain in the knee than elsewhere.

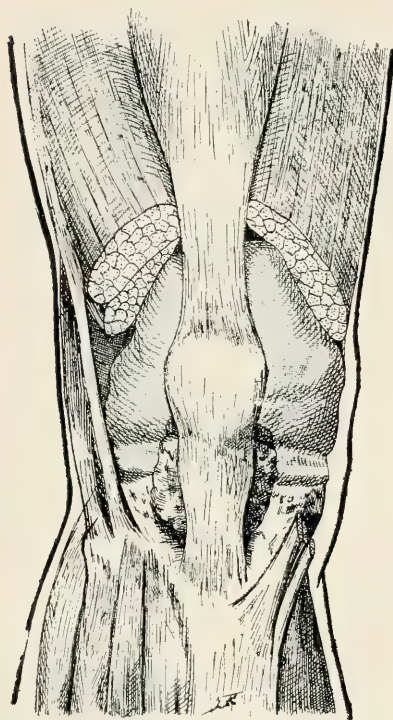


Fig. 533. — The same seen in front (always tinted grey) exposed to view on each side of the patella.

With the best treatment we succeed in scarcely more than half the cases (in the knee).

Moreover, the mobility is not always desirable for the patient, as you will see.

The functional result to be looked for in the knee.

1st. In children and in adults of the upper classes.

You will look for cure **with preservation of movement** only when the white swelling is benign and recent, and when the position and suppleness are normal or nearly normal.

You will succeed then, in preserving the mobility, in $\frac{3}{4}$ of the cases in children and in half of the cases in adults.

This is how you will do it : you will not leave the plaster on for more than 4 or 5 months, namely, two months while the injections are being used, and for 2 or 3 months after that; afterwards leave the knee free, with a simple bandage of Velpeau crepe, but still at rest in the horizontal position for 5 or 6 months; that makes 10 to 12 months for the total duration of treatment.

Then you may allow patients to stand on their feet; let them walk with a large apparatus in celluloid reaching from the pelvis to the foot, but jointed at the hip and ankle. The apparatus is removed during the intervals between the walking exercises, and all night. Remove it entirely after a year's use.



Fig. 534. — *Searching for fluctuation.* — Make the fluid move from the periphery to the centre by pressing over the synovial sac, above and below the patella, with the two hands in the form of a horse-shoe (1st step).

You look for cure by **ankylosis**, on the contrary, in all cases of rather old white swellings (dating back a year or more)



Fig. 535. — 2nd step; Keeping up the pressure, one brings the hands together and with one of the index fingers, one taps on the patella as one touches the piano; in this way one obtains the **patellar « choc »**, the sign of the presence of fluid.

and of grave character, with a markedly vicious position (flexion of more than 20°, with subluxation outwards and backwards).

Look for it also in *all cases of the first group* where the move-

ments, having been preserved or recovered, the position becomes bad as soon as the patient is left without the apparatus or when



Fig. 536.

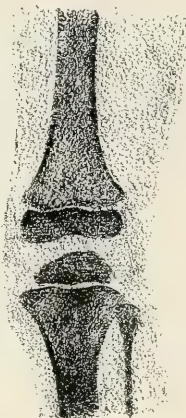


Fig. 537.

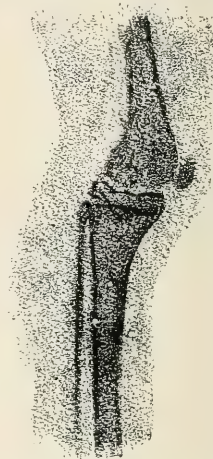


Fig. 538.

Fig 536. — The first radiogram to the left of the reader (fig. 536) is that of the affected side. The second (fig. 537) that of the sound side. — A child of six and a half years — Tuberculous arthritis of four months standing. General tint brighter, the interline more narrow, epiphysal parts more developed over the affected knee. Fig. 538. — White swelling of the knee, one and a half years standing (a child of seven years). — The interline is blurred; the diaphyso-epiphysal angle of the tibia presents an anterior concavity.

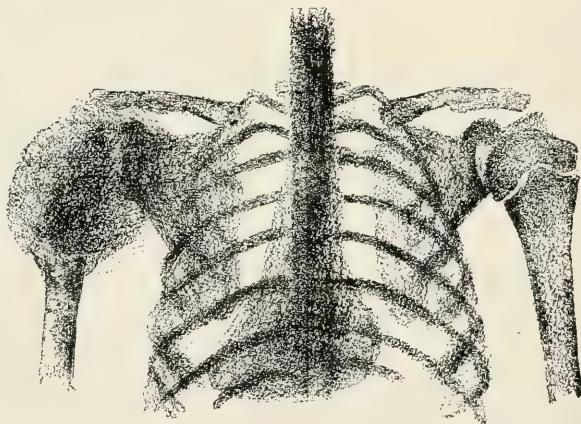


Fig. 539 — Osteo-sarcoma of shoulder (had been mistaken for a white swelling).

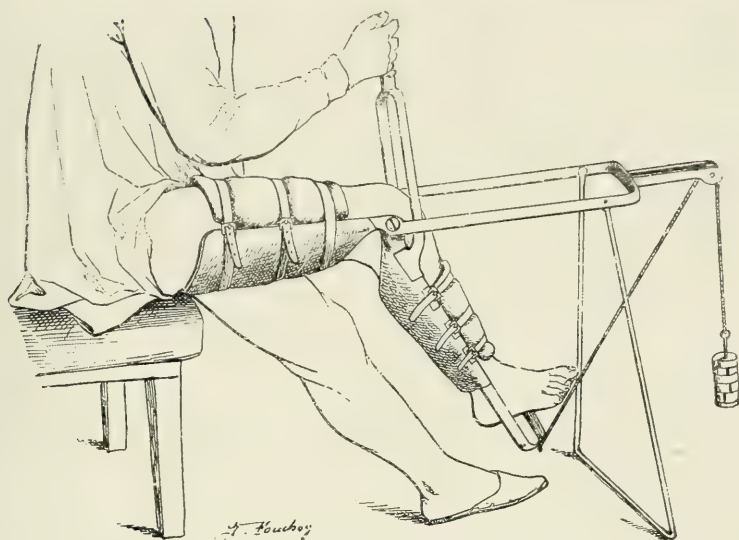


Fig. 540. — Bonnet's apparatus for mobilising the knee.

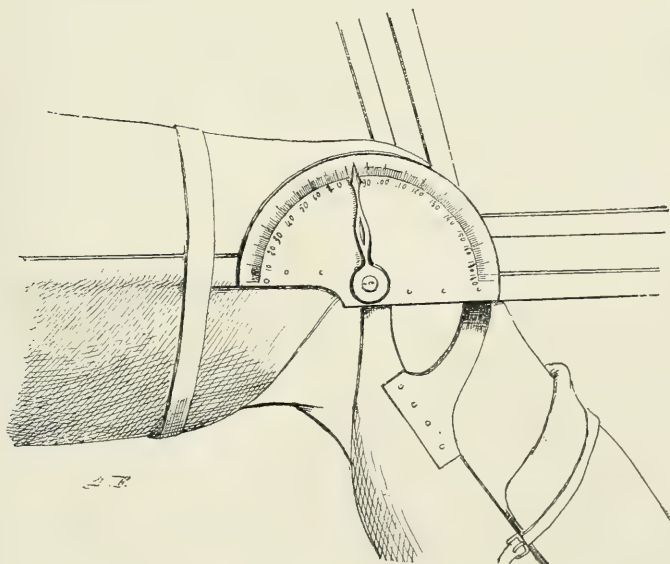


Fig. 541. — View of the knee part of the apparatus fig. 540.

he is noticeably lame or incapable of taking a long walk.

To obtain ankylosis, he is made to wear knee-caps of plaster or of celluloid until the knee, "let loose", for a few days, keeps straight of its own accord, which sometimes requires three or four years or even more. When the knee has been



Fig. 542. — A more simple arrangement for mobilisation of the knee.

cured for at least a year, and remains in good position, you may leave off the apparatus.

The knee will be stiff but the result remains however, very satisfactory.

Especially **beware of all forcible mobilisation** with or without chloroform.

These forcible mobilisations are the causes, as we have said,

of far too many disappointments to practitioners who are not specialists.

Confine yourself to massage, to daily baths, saline or sulphurous, to some attempts at flexion made by the patient in the bath, by the action of the muscles of the leg alone.

At the most, and quite exceptionally, and only a year after the cure is unmistakeable, would you allow very gentle, very cautious exercises, made with graduated machines moved by the patient himself¹, progressing by only a degree or a degree and a half every day (fig. 550 and 542).

And you must always be prepared to stop these exercises at the first sign of inflammation, and in that case, to abandon altogether your attempt at obtaining articular mobility.

Besides, it **very often** happens (in more than a third of the cases), that **movement returns spontaneously**, without any special treatment, a year or two after the cure of a tuberculous arthritis. — Everyone has seen examples of this, especially in very young subjects.

II. — *Children and adults in hospital or of the working class.*
— After the preceding considerations, need we especially mention that, one ought not, in patients of this category, to look for a cure with preservation of movement?

Cure them with the knee stiff. When the knee has remained in a good position, a year and a half or two years after the cure has been accomplished, free the patient from all kind of apparatus.

We have observed in our hospital children as well as in private cases, but a little less frequently, that mobility has returned in due course, spontaneously.

3rd. *From the point of view of THE CLINICAL ASPECT and of the THERAPEUTIC INDICATIONS.*

We will add just one word to what has been already said concerning **deviations**.

A lateral deviation (**genu valgum** or **subluxation of the**

1. See my *Traité des tumeurs blanches*, Masson, p. 220.

tibia outwards and backwards) nearly always accompanies direct flexion of the tibia (fig. 543, 544). — As to complete luxation of the tibia backwards (fig. 545, 546), into the popliteal space, you will doubtless never see it; I have seen it only twice in seventeen years.



Fig. 543.— Another type of white swelling. Fig. 544.— W. Sw. with genu valgum.

But we must draw your attention to the **lengthening** of the affected **leg** which is **often** produced in these white swellings, and is due to the greater fertility of the articular cartilages of the affected side than of the sound one.

This fertility is rarely ever stimulated, and **lengthening** only exists in **benign arthritis**; it is often compromised **on the contrary**, in **severe white swelling**, whence here there is **shortening**.

Lengthening, where it exists, is only temporary; after one, two or three years, the cartilage of the sound side overtakes the other and the equality of the two legs is re-established.



Fig. 545. — Lucien L... of Paris. — Complete luxation of the tibia into the popliteal space, existing about five years (radiogram).

In the meantime, for walking, you would have to provide a thick sole for the sound limb.

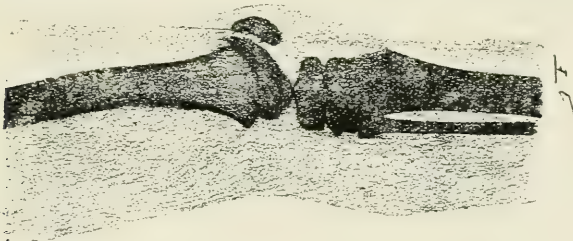


Fig. 546. — The same, after reduction, without surgical interference. — The reduction was made November 18th 1905 (under chloroform). — With the apparatus shewn in figures 867 and 868, we made traction on the leg up to 70 kilogrammes for 15 minutes, which pulled down the articular surface of the tibia to the level of the surface of the femur. — Then, by pressure downwards on the femur and upwards on the tibia we brought the two surfaces into contact. — Afterwards, a large plaster (from the umbilicus to the toes). In the plaster, we made, the next day, two openings; one in front, opposite the condyles, the other behind, opposite the tibial tuberosities, and by these openings a double cotton-wool compression (as in our apparatus for Pott's disease), to maintain and further perfect the reduction. Five months later the reduction persisted.

4th From the point of view of TREATMENT.

We will add to what has been said, in the *Generalities*, a few words on the apparatus. the correction of vicious positions. the technique of injections and the surgical operations on the knee.

A.— The Apparatus.

To immobilise the knee satisfactorily, if it be a question of preventing a deviation or maintaining a correction, it is neces-

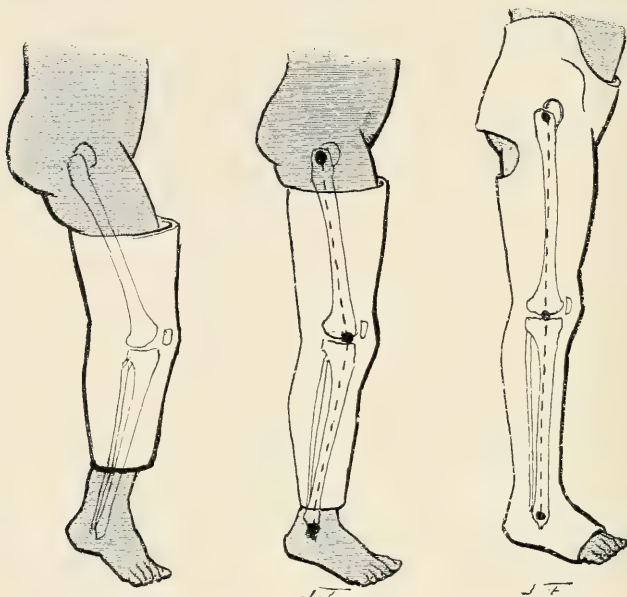


Fig. 547.

Fig. 548.

Fig. 549.

Fig. 547. — The small knee piece very often made. Much too short and too loose; the soft tissues can be pressed in by the edges of the knee piece and deviation is produced at will.

Fig. 548. — A longer knee piece; but still defective, for the same reason, but in a lesser degree.

Fig. 549. — The perfect method of immobilising the knee. — Our large plaster, which takes in not only the knee, but also the two neighbouring joints.

sary to make a large plaster which includes the two adjacent articulations (hip and ankle).

It is sufficient to cast one's eyes on the diagrams above, to see how the classical "knee-piece" is incapable of immobilising the two articular levers, in cases ever so little intractable. The plaster, then, must reach from the umbilicus to the toes

and will be in every way the same as the large apparatus for hip-joint disease (fig. 547 to 549).

When large orthopædic apparatus (celluloid or leather) are used, they may be articulated at the hip and the foot, leaving the knee fixed.

It is only when the tendency to deviation no longer exists that one can dispense with taking in the two neighbouring joints (fig. 550). A medium plaster is then used, reaching from the ischium to the toes, and immobilising only one of the



Fig. 550. — The medium apparatus reaching from the ischium to the toes.

adjacent articulations, or, even simply the ordinary knee-piece which leaves them both free.

Finally, let us say that, to immobilise the knee, circular plasters are better fitting and more accurate than splints, and ought, in consequence, to be preferred.

The large anterior opening of the circular plaster allows of the examination of the knee and of the articular injections being made without difficulty.

B. — The Correction of Vicious Position of the Knee Joint.

a. *Continuous extension* may be of service in private cases where the parents dislike plaster (fig. 552, 553).

When it is a question of deviation at the onset, and you are able to attend to it very closely, you will in this way obtain the correction — with a continuous extension arranged by you and looked to every week.

But it is simpler to redress than to put on a plaster.

b. *Forcible redressment of the knee.* We have only a little to add to what has been said in the *Generalities*.

Take care to make **more traction** on the foot than **direct pressure** on the knee (fig. 554), which would lead to bruising or fracture of the articular extremities.

The traction should be responsible here for three fourths of the correction of the bad position, and the pressure for less than one fourth. This applies to the redressment of direct flexions.

But one must not forget that, generally, there are lateral deviations as well.

Scrutinise thoroughly the different elements of these complex deviations, of which the two most frequent types are : *flexion and genu valgum*, *flexion and sub-luxation* of the tibia outwards and backwards.

You act upon these different factors at the same time. Thus, whilst an assistant makes traction on the foot to correct the flexion, you yourself exert all your strength on the upper extremity of the tibia, in order to correct the sub-luxation, forcing the tibia from behind forwards and from without inwards

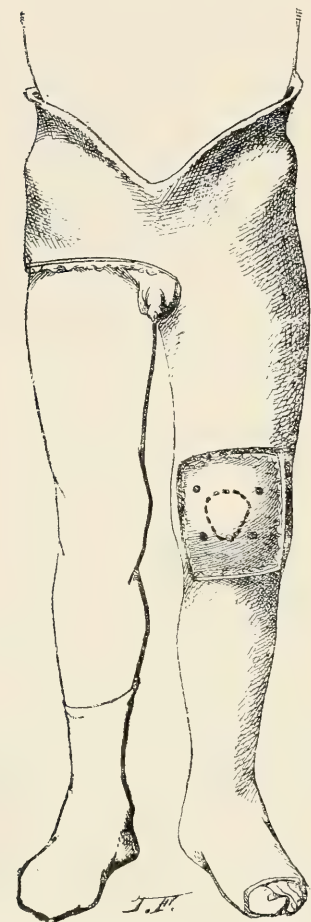


Fig. 551. — Large apparatus with an opening allowing the treatment by puncture and injections.

with one hand, whilst with the other, you push the femur in the opposite direction (fig. 554).

Repeat the movement, persisting for several minutes; it is

necessary to persist, because, if the deviation be of old standing, there exist osseous irregularities which render redressment difficult to carry out.



Fig. 552. — Sheep-skin gaiter and stirrup, for continuous extension of the knee in white swelling (see fig. 553).

Complete the correction at two sittings, it is easier for you and better for the patient. In this way you tear nothing. I

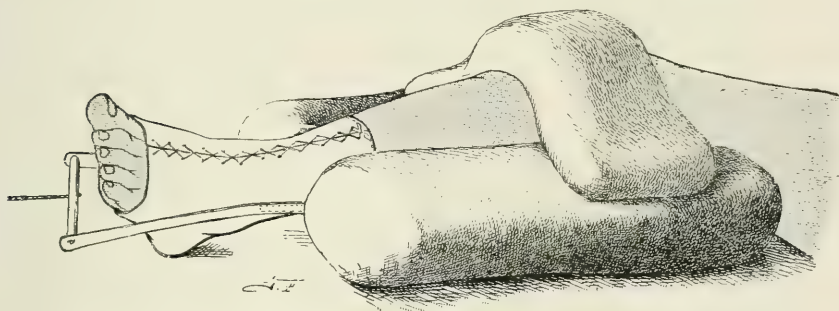


Fig. 553. — A sand bag is placed on each side of the knee to steady it; a third sand bag is placed over the patella and assists in the continuous extension, for correcting the flexion.

speak only of the osseous extremities, for injuring the popliteal vessels and nerves is scarcely conceivable, in spite of what is said in certain books : I have never observed it in my own practice.

Correction of Ankyloses.

Do not interfere with ankyloses in good position. Redress those in bad position — by the method I have just described; it is always (or nearly always) possible to arrive in this way, under chloroform, at a correction of very old standing deviations, even those labelled, **Ankyloses of the Knee.**

When the patients are anæsthetised, if one examines well, one finds some indefinite movements in the joint; but this very slight mobility is sufficient for one to be able to promise the straightening of the knee merely **by manœuvres**, which simplifies matters considerably. Those manœuvres you already know (fig. 554).

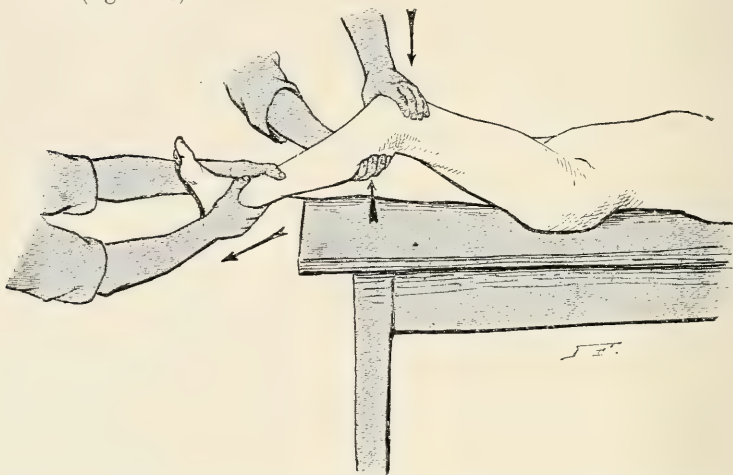


Fig. 554. — Redressment of a bad position. An assistant makes strong traction in the direction of the deviation; the surgeon applies moderate pressure on the femur and pushes forwards the upper extremity of the tibia. The patient is held firmly by the arm-pits, and by the medium of the limb flexed over the abdomen (fig. 439 and 440).

After having, for some minutes, made gentle traction and pressure, you fix with a good plaster apparatus the partial correction obtained, which is sometimes scarcely appreciable. The traction and pressure are kept up whilst the plaster dries, which will be a gain of several degrees — and so you leave it for 15 or 20 days. After which, a second sitting for redressment, which will give you a much more appreciable correction.

If need be, you make a third correction, and, finally, you have corrected, without surgical interference, deviations for which some other practitioners might have judged a resection or an osteotomy indispensable.

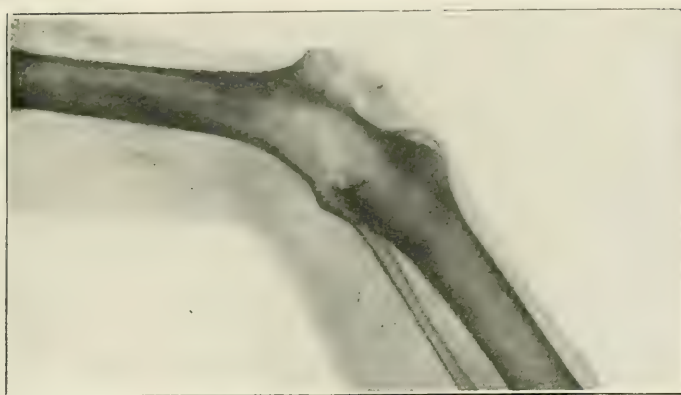


Fig. 555. — Osseous ankylosis, of 21 years standing, in a woman thirty years of age. Notice the complete fusion of the femur and tibia, so complete that there is a medullary canal in the osseous bridge which unites them. Shortening 19 cm. Walks with crutches. — The patient asked to be redressed, **but without surgical operation**. If impossible to effect this without an osteotomy, she would prefer to retain her infirmity, however inconvenient.

Given this ultimatum, we decided upon performing osteoclasis. For that, we strengthened the femur and tibia with wooden splints, 4 on the thigh, 4 on the leg, held in position by straps (see p. 460, fig. 466); and (under anæsthesia) we applied pressure with all our strength (two of us) so as to increase the flexion of the limb, the femur being held by two assistants. After two or three minutes of effort, the limb gave way with a creaking sound and became flexed at an acute angle, then we brought it back into extension. Large plaster for two months. — After effects very slight.

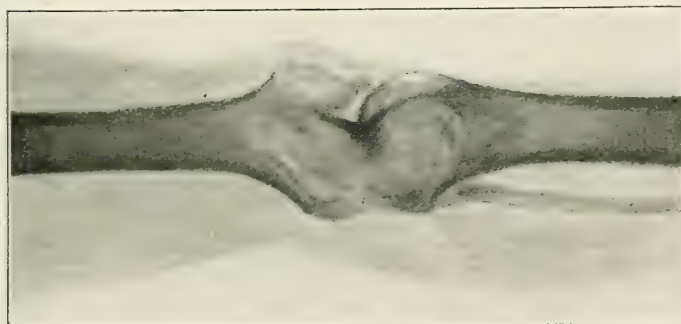


Fig. 556. — The same three months after osteoclasis. — We had broken the bone at exactly the spot we wished, opposite the old articulation. One sees the debris of the patella. — *The result is perfect*. Instead of 19 cm. of shortening, scarcely a centimetre and a half remained (due to atrophy). We took great care to do nothing to restore mobility to this knee. — The lameness has disappeared.

You can avoid also division of the popliteal tendons, which is really easy with the technique described in Chap. XIII.

(And the same applies to the case, rather rare, of osseous ankylosis. It would be quite easy to perform a supra-condylar osteotomy by the method explained in Chap. X.)

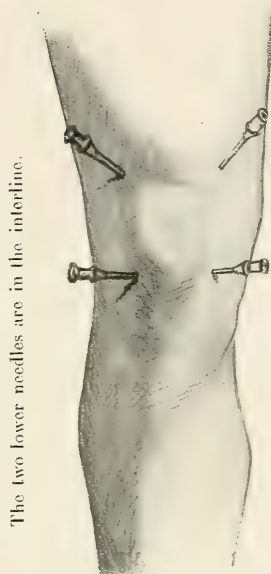


Fig. 557. — Points of access to the knee-joint.

C. The Injections.

The culs-de-sac of the knee-joint are so extensive, so superficial and so accessible that injections here are particularly easy, provided you are not dealing with a chronic white swelling of several years' standing, where the cavity is obliterated or full of adhesions.

Remember that the interline of the joint corresponds with an horizontal passing through the apex, or inferior angle of the patella (fig. 557).

The **apex of the patella** is perfectly appreciable to the finger. **On each side** of it one easily feels a **depression**. A needle pushed into the depression would penetrate the knee-joint.

Here already are **two points of access** to the joint.

There are **two others**, at a centimetre and a half **above** the base of the patella, and at a centimetre and a half **outside** (with reference to the axis of the limb) the two superior angles of the bone.

If one punctures there, one penetrates into the sub-tricipital prolongation of the synovial cavity.

As a general rule, it is **into this external part of the sub-tricipital prolongation** that I make the injections and I **advise you to make them there**.

One can make the cul-de-sac bulge out at this external point

by exerting pressure on the other points, that is, above and on the inner side of the patella, and below it, on each side of the patellar ligament.

Plunge your needle into the superior external cul-de-sac, not directly backwards, but a little downwards and inwards, in order that the point enters the inter-condyloid notch, between the femur and the under surface of the patella. You will feel that the needle is at once enclosed and free between the two bones.

When you have this sensation, you are sure to be in the desired position, exactly in the articular cavity.

If you puncture the skin too near to the patella, or, if the obliquity of the needle is excessive, you run the risk of striking the base of the patella and missing the cavity. Therefore puncture at a centimetre and a half, or even two centimetres above and outside the supero-external angle of the patella, and give the **needle** an **inclination of about 45°**.

You ought to feel the femur with the extremity of the needle; but you avoid driving the point into the bony tissue because this might break it, or obstruct it, which would render the passage of the liquid impossible. Consequently, you push the needle firmly and slowly through the soft tissues up to the femur, and, when you have felt the bone, you gently withdraw your needle for a few millimetres; you ought then to feel the point move about between the patella and the femur. At this moment, you should push in the injection without hesitation, and you will see a swelling, not only in the sub-tricipital cul-de-sac, but also in the inferior



Fig. 558. — Obliquity is given the needle in order to be sure of penetrating into the joint cavity (*idem*, when one penetrates by the supero external cul-de-sac).

lateral culs-de-sac, on each side of the apex of the patella, and you will at the same time see the patella distinctly raised.

The Injections in Old White Swelling of the Knee.

In old standing cases, as I have said, it may be that the sub-tricipital cul-de-sac is obliterated or cut off from the general cavity, and that the patella is adherent to the inter-condylar groove.

In that case, if you would be perfectly sure that you have penetrated the cavity, or rather what remains of it, puncture on each side of the patellar ligament, exactly in the interline; puncture somewhat obliquely, going from the lateral point to the centre, in such a way that the end of your needle reaches the inter-condylar groove, exactly behind the patellar ligament.

The liquid introduced at these points cannot take a false route; it will penetrate between the two articular surfaces — when there are interstices between them.

At the same sitting, you should afterwards make a second injection, directly into the sub-tricipital cul-de-sac, so as to be certain that you have reached the whole of the affected parts.

After the classical treatment of injections thus pushed more or less freely into the cavity, should the patient complain of one or more points being particularly painful, either on the outer side, or above the interline, one may infer that some independent small foci persist, which have not been reached by the injections made into the general cavity.

You should then make a supplementary series of injections into the painful points, pushing the needle up to the surface of the bone, beneath the periosteum.

D. Some Remarks on Surgical Operation on the Knee Joint.

I will not explain the technique of amputation of the thigh and will not delay in describing to you all the surgical operations which have been performed, or proposed, for the treatment of white swelling of the knee: erosion, synovectomies, arthrec-

tomies, — and I shall not do so because I consider these economic interventions to be bad operations.

These operations, which do not reach beyond the limits of the disease, have scarcely any advantage over resection. They have only cured white swelling entirely at its onset, where the lesions were almost nil, where treatment by injections or even conservative treatment would have been sufficient. That is to say, they are perfectly useless; to their uselessness one must add nearly all the disadvantages of large surgical operations : the dangers of fistulae, of tuberculous infection, etc.

The only surgical operation you will **sometimes** have to perform is **resection of the knee-joint in adult working people**; there is no question of this in children, where it would be disastrous from the point of view of shortening of the limb.

What you may chiefly have to perform is **drainage of the joint** for articular abscess which has been, by mistake or simply by omission, allowed to open, — and, by a second error, has been allowed to become infected.

a. Technique of Drainage of the Knee-joint.

Take care to open the joint cavity at its most dependent points (fig. 559 and 560).

You know that, performed methodically as it ought to be, drainage comprises **four “ lateral ” incisions, parallel to the axis of the limb**, two on each side — seven or eight centimetres in length.

The two antero-lateral incisions run along the sides of the patella, the two postero-lateral, rather smaller, correspond to the two latero-posterior borders of the condyles.

These two last incisions replace posterior drainage directly through the popliteal space, which is more difficult and could only be done by opening the joint freely and extensively.

Through each of the antero-lateral incisions one inserts a large drainage tube through to the postero-lateral incision.

You will foresee that one could, in the same way, join the

two antero-lateral incisions by two supplementary drains, the one passing above, the other below, the patella.

The internal postero-lateral incision, made over the poste-

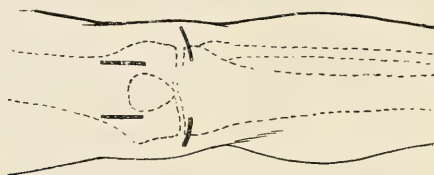


Fig. 55g. — Drainage of the knee-joint. — For the two upper incisions and the infero-internal incision, follow the indications in the diagram; but the postero-lateral external incision *ought not to be made as it is figured, in a direction perpendicular to the axis of the limb; give it a direction parallel to that axis, so as to be absolutely sure of avoiding the external popliteal nerve.*

rior border of the internal condyle, does not require very great precision. It is not the same on the outer side, on account of the presence of the **external popliteal nerve**.

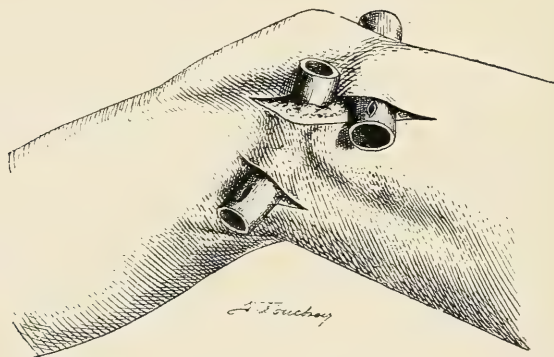


Fig. 56o. — Knee-joint viewed on the inner aspect. — The different incisions giving passage to drainage tubes which join them together.

To avoid it with certainty, one must take as a land-mark the tendon of the biceps, which is easily recognised (fig. 736); the nerve is a centimetre and a half on the inner side of the tendon. One has therefore only to keep always on the outer side of the tendon and stop the *lower* end of the incision at the

articular interline (the interline corresponds to the apex of the patella with the leg in the extended position).

b. On resection of the knee-joint

One will find the technique of resection at length and very well described, in Farabeuf's book. Here we will make, on this subject, simply some personal remarks which will complete what you already know.

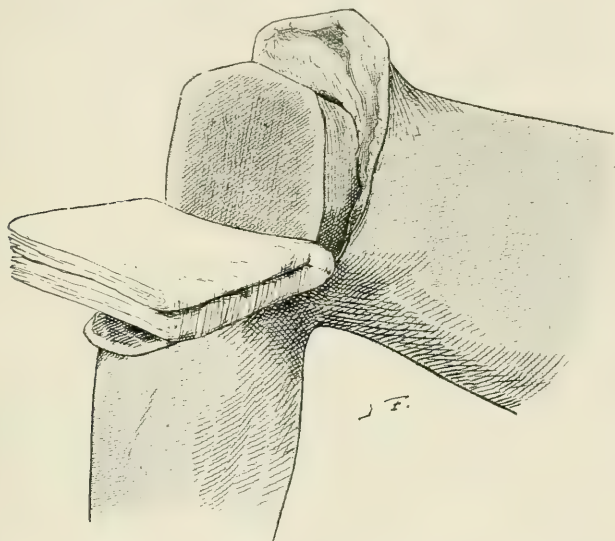


Fig. 561. — Arrest of hamorrhage after resection. — *1st step* : one places, between the two bleeding osseous surfaces, a compress folded in several doubles.

You will use an Esmarch's bandage, which gives you greater facility for seeing and removing the diseased parts.

You perform the resection of the two articular extremities with a small saw or a very large chisel, — a resection not too extreme nor too sparing, so as to remove the whole of the diseased parts of the bones, cutting for a few millimetres — not more — into the healthy zone; then you cut away all the suspicious soft tissue, with scissors and dissecting forceps, expending as much attention and time as may be necessary.

The toilet of the bones and soft parts being completed, the exact adaptation of the surfaces of bone well ascertained,

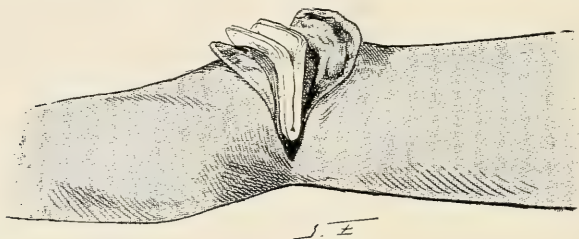


Fig. 562. — *Second step* : the limb is afterwards placed in the straight position.

place some compresses between the surfaces of the two bones, the leg being carefully held in the flexed position; you place two

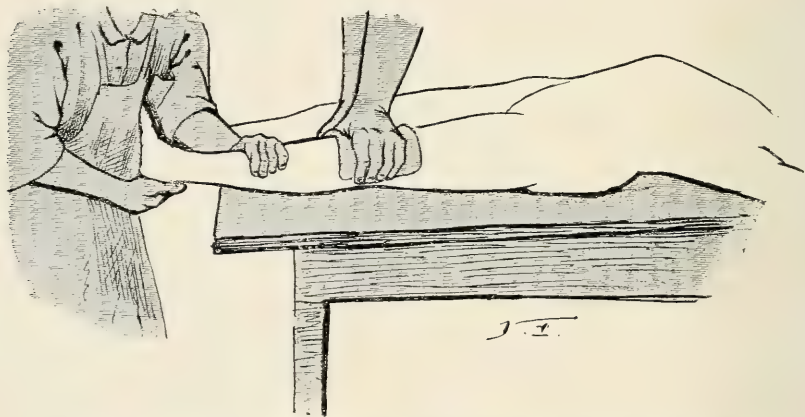


Fig. 563. — *Third step*. One or two other compresses are placed over the wound : the surgeon exercises continuous pressure with both hands whilst his assistant supports the foot and presses the limb upwards, with the foot applied to his breast.

other compresses in front of the bones, between the bones and the corresponding soft parts, and get ready to apply compression, whilst the Esmarch bandage is taken off (fig. 561 to 563).

You **press** very exactly in this way for **ten or twelve minutes**. That suffices to ensure the arrest of hæmorrhage without the application of ligatures. I scarcely ever apply

ligatures to the small vessels. — and the advantage is great

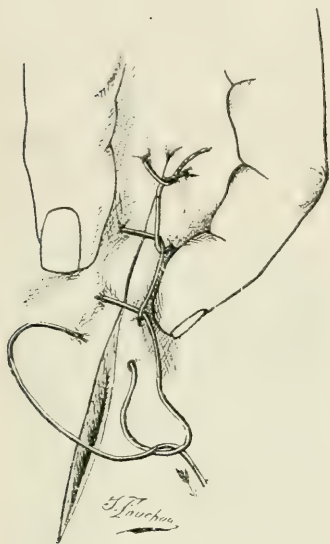


Fig. 564.

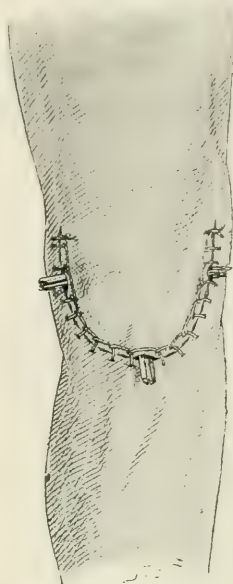


Fig. 565.

Fig. 564. — The method of suturing the skin (overcasting with cat-gut).
 Fig. 565. — Suture completed; at three different points, strips of cat-gut have been inserted to ensure drainage.

in not leaving any foreign bodies in the wound, in order to be certain of obtaining union by first intention.

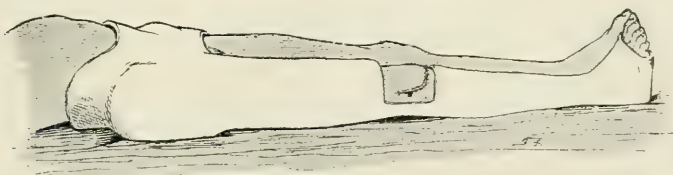


Fig. 566. — Plaster apparatus furnished with an opening which allows of inspection and dressing of the operation wound; it is closed again after each occasion with a plastered bandage.

If bleeding returns after twelve minutes, keep up the pressure for five or six minutes longer; it is not time lost.

If, which you rarely see, a vessel bleeds again at this time, it is quite open to you to use a cat-gut ligature, but you will still gain much by prolonged pressure, seeing that, in place of twenty ligatures, you will have only one to apply.



Fig. 567. — Ordinary stocking or sleeve of jersey, and a lath underneath; for moulding the knee.

Hæmorrhage being quite arrested, you pass on to the adaptation of the bones. You will have no occasion to suture the bones, thanks to the large plaster which you apply; you suture



Fig. 568. — A celluloid apparatus for walking. The hip and ankle are jointed and moveable. The knee is rigid or mobile as desired.

the skin only with an overcast stitch of catgut as figured here (fig. 564).

This suture takes a minute : the twelve minutes lost in compression are regained here.

Three strips of cat-gut or three small drainage tubes are inserted, to prevent the accumulation of the sero-sanguineous effusion in the wound (fig. 565).

The suture of the skin and the drainage may thus be done with bodies which are entirely capable of being absorbed.

The **apparatus** is here of capital importance and merits the closest attention. It is a large plaster, very well fitting, which reaches from the umbilicus to the foot, as shewn here (fig. 566). One commences by making the part of the apparatus which extends from the toes to the root of the limb,

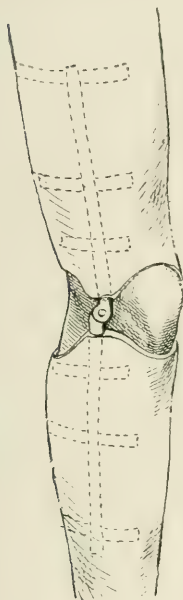


Fig. 569.

Fig. 569. — Knee apparatus (in plaster) furnished with a joint. — To render this jointed knee apparatus moveable, it is sufficient to cut it into two plastered sheaths in the anterior median line and to trim the edges.

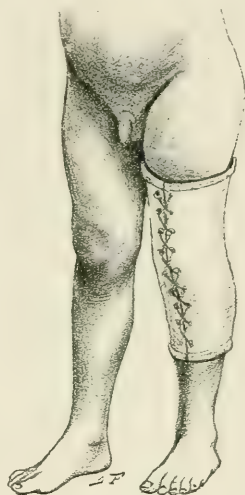


Fig. 570.

Fig. 570. — Knee apparatus in celluloid, serving at the most to protect the knee but not sufficient to prevent displacement.

modelling it well around the knee and the malleoli, then, when the setting of the plaster is completed, or thereabouts (after waiting about five or ten minutes), one constructs the abdominal portion.

The patient is placed on the pelvi-support, in order to do this. The junction between the abdominal and leg portions is easy to make, with a few turns of plaster bandage applied as a spica from one to the other, and some strengthening squares

(see p. 420 for the method of construction of the plaster apparatus). When the last bandage has been applied, one models the apparatus very accurately round the pelvis. This precision prevents even the slightest displacement of the two articular surfaces placed in contact with one another; one obtains in this way perfect union, in correct position, without mentioning the advantage which the apparatus has in ensuring arrest of hæmorrhage and the prevention of all inflammation and all pain by the mathematical immobility which it affords.

If, which is very unusual, fever should supervene, there is nothing to prevent one making one or more temporary openings opposite the suture, in order to examine the wound and rectify the drainage (fig. 566).

On the fiftieth day, one removes the plaster, replacing it by another, or still better, by an **orthopædic apparatus** (fig. 567 to 570) with which the patient will be able to walk, after a week's rest, at about the sixtieth day.

But, **if need be**, the patient will be able, being provided with the large plaster apparatus we have just described, to get on to his feet ten or fifteen days after the operation and walk with the help of crutches.

Convalescent Apparatus for White Swelling of the Knee (v. fig. 567 to 570).

From the moment of being placed on his feet, the child is supplied with a large apparatus in celluloïd (extending from the umbilicus to the toes), similar to that used in the convalescence of hip-disease — with the difference that in hip-disease one leaves the hip rigid and articulates the knee and foot (of the apparatus), whilst in white swelling of the knee it is the knee (of the apparatus) which is left rigid, the hip and the foot being articulated. But a little later one can articulate the knee in its turn.

In the case of children of the working class who cannot go to the expense of a celluloid, you will apply, even for the period of convalescence, a plaster knee apparatus, reaching from the trochanter to the malleoli (v. p. 569).

WHITE SWELLING OF THE ANKLE-JOINT¹

a. DIAGNOSIS (IT'S PECULIARITIES)

In adolescents with affections of the ankle-joint, it is necessary to guard against mistaking a simple *tarsalgia* for tuberculous arthritis. It is sufficient to remember this in

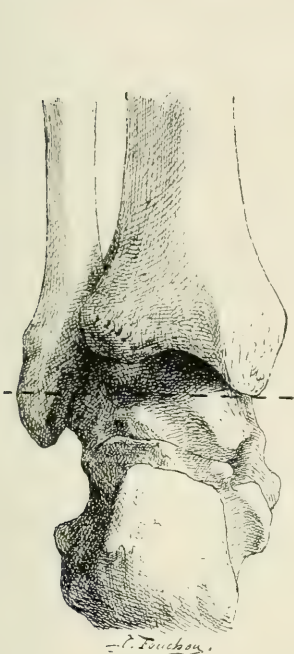


Fig. 571. — Skeleton of the ankle-joint, posterior view.

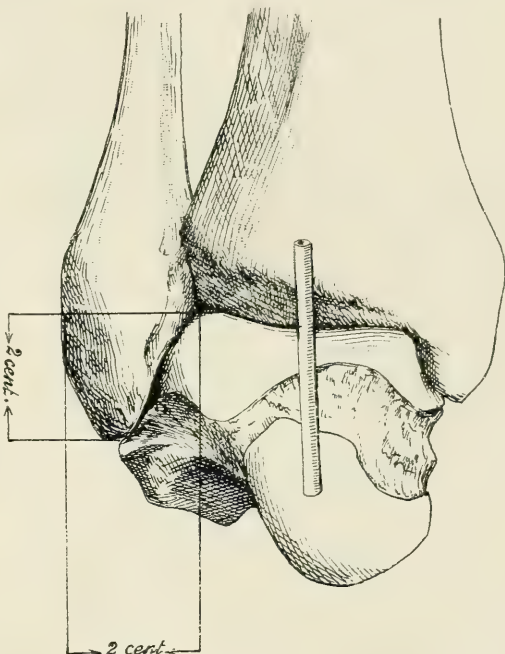


Fig. 572. — The same, anterior view; measurements to find the places of election in the adult.

order to prevent error. The conformation of the foot (the bulging on the inner side of the astragalus and scaphoid, the deviation of the foot on the outer side in abduction, the sole of the foot generally very flat), the absence of appreciable fungosities, enable one to make the diagnosis (v. also *Tarsalgia*, chap. XII).

1. See thesis of Dr Balencie, 1904.

b. PROGNOSIS

It is here particularly favourable : cure is nearly always effected with preservation of movements.

The functional result to be aimed at.

Follow the same general principles as for the knee. They will conduct you to a complete cure.

If, in a very exceptional case, the foot become stiff, do not endeavour to alter this, as long as the position is good. Moreover, if the ankle has preserved some amount of movement, but retains a certain equinism, which makes the patient lame, do not hesitate to place the foot at a right angle and keep it so with a plaster as long as is necessary so as to secure a good position, at the risk of ankylosis occurring.

The play of the neighbouring articulations, the sub-astragaloid and the mid-tarsal, will supplement, in great measure, this stiffness of the ankle, which may, perhaps, be only temporary.

c. PARTICULARS OF THE TREATMENT

1st The injections

First, some anatomical points to establish the technique of the injections (fig. 571 to 575).

The synovial cavity of the ankle-joint permits of the needle entering in front at one of the lateral angles of the interline, and also behind, at the external part by preference, away from the posterior tibial vessels. In front, one will easily avoid the anterior tibial artery and vein, placed in the middle of the anterior surface.

It is necessary to use fine needles (n° 1, or at most, n° 2, of Collin). The internal angles will be wider if the foot is carried outwards, and, inversely, the external angle will be wider if the foot is carried inwards.

As a general rule, I make the injections **in front**, alternately on the inner and outer sides (fig. 574) of the interline (**over the lateral angles**).

But if you find, at your first visit, an appreciable swelling

of the serous cavity at another point, it is there, in the centre of the fungous mass, quite accessible, that you convey the modifying liquid.

It is in front, or almost as frequently in the dependent parts behind, against the malleoli, or even close to the tendo Achillis, that these fungous masses are produced. When they become apparent at the second, third, or fourth injection, the treatment be-



Fig. 573. — Transverse section of the ankle-joint.



Fig. 573 bis. — One penetrates at the antero-external angle of the tibio-tarsal joint. It is not necessary to push the needle so far in as is shewn here.

comes much easier. The injection and the puncture, if there is fluctuation, are made at these points.

If at the same time there are an anterior and a posterior projection, we will choose the latter by preference, because behind, the synovial cavity is much further removed from the skin than in front and we are all the more secure from the risk of producing a fistula. One may see indeed, sometimes, the skin give way in front, after too great distension of the cavity of the joint in the course of treatment by the injections.

But it is a simple rupture of the skin through excess of tension,

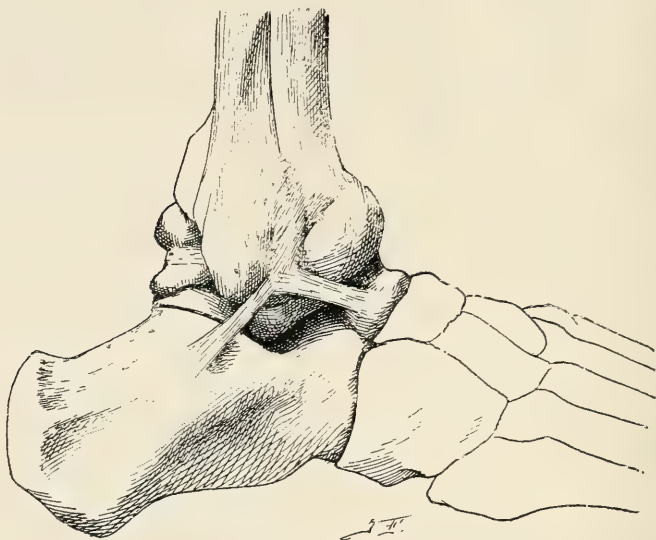


Fig. 574. — View of the external aspect of the joint after injection into the synovial cavity

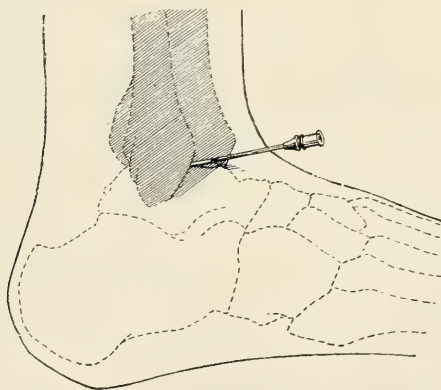


Fig. 575. — One of the two points of election for penetrating the joint.

that is, a non-infected fistula. It is sufficient to discontinue

the injections and treat the part with good aseptic dressings



Fig. 576.— Plaster for the ankle : position of the surgeon's hands during the drying of the apparatus.

for a week or two, to see it close. One then returns to the injections, if one has not already given the requisite number.

2nd The Apparatus

(fig. 576, 577).

This reaches from the toes up to the interline of the knee, or at least up above the calf.

One must take great care to place the foot exactly at a right angle and even at an angle slightly acute, as a preventive measure, because of the natural tendency of the foot to take on extension; for an analogous reason, in hip-joint disease, we place the thigh, as a preventive measure, in hyper-extension and slight abduction.

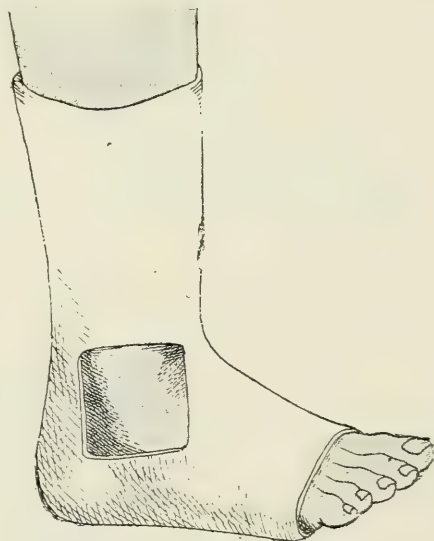


Fig. 577. — The same, finished, with an opening opposite the external malleolous.

Instead of making an opening at the anterior part, through which to make the injection, we prefer to make a bivalve apparatus, anterior and posterior, or lateral, in such a way as to be able to remove it at each new injection (v. fig. 42, p. 59). This allows of a more complete exploration round the joint.



Fig. 578. — Taking a mould of the ankle (v. p. 97). Ordinary stocking split at the ends of the toes. A strip of zinc is placed under the stocking upon the skin.

The puncture and injection being made, and a slight dressing applied, one re-encloses the leg and the foot, taking great care to replace the heel very exactly in the most dependent part of the apparatus in such a way as to restore it to a right angle: without this the foot acquires spontaneously a position of equinism. In this way one prevents deviation.

One uses these bivalves again in cases where there are multiple fistulæ.

3rd Deviations.

If the foot has already become deviated, you will know the way to correct it during the course of treatment by injections. To do that, you will make, after each injection (or every two sittings) a new small plaster, which takes two minutes (two bandages to roll); before the plaster is set, you endeavour to gain a few degrees of correction by a **gentle but sustained pressure** of your hand applied to the sole of the foot, while the other hand firmly supports the leg portion of the bandage.

As to the deviations observed in a white swelling already cured, the simplest way to obtain the correction is with a



Fig. 579. — Mould of the foot with strengthening pieces.

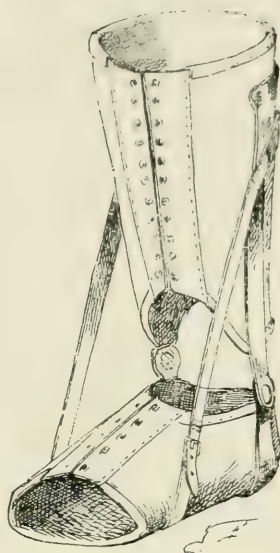


Fig. 580. — Celluloid apparatus with elastic bands for the progressive redressment of the foot.



Fig. 581. — For the progressive redressment of the foot.



Fig. 582. — Plaster apparatus with a joint.

series of plaster apparatus, such as we have described.

One could use, in place of a plaster, an articulated apparatus in celluloid or leather, to the anterior part of which might be attached two elastic bands cross-wise, to approximate the two articular levers (fig. 578 to 583). One might also correct old standing deviations, particularly the lateral deviations in valgus

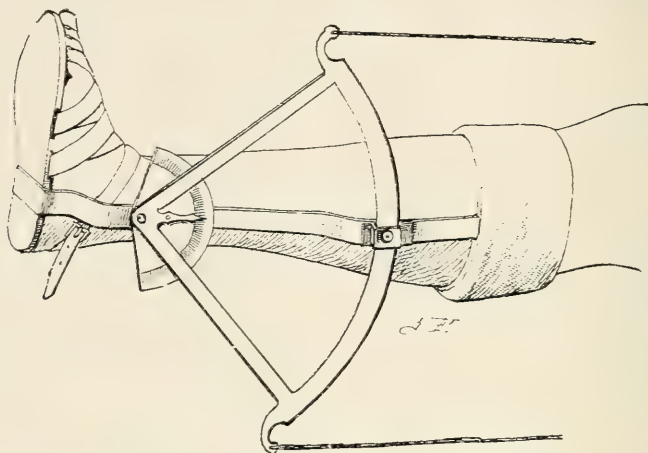


Fig. 583. — Bonnet's apparatus for mobilisation of the ankle. But, if you are not a specialist, **keep it for stiff joints, not tuberculous ones.**

or varus, with the lever boot which we use for club-foot (v. Chap. xxv). In a general way, do not interfere with ankylosed joints which are in good position.

WHITE SWELLING OF THE MEDIO-TARSAL AND SMALL JOINTS OF THE FOOT

Here, also, take care not to mistake a white swelling for a tarsalgia, and conversely. We have mentioned how the diagnosis is made (v. also Chap. xii).

One treats a medio-tarsal arthritis like an arthritis of the ankle (see above).

When one is dealing with the small articulations of the

foot, it becomes very difficult to push the injection into the joints when they are so compressed together (fig. 584, 585).

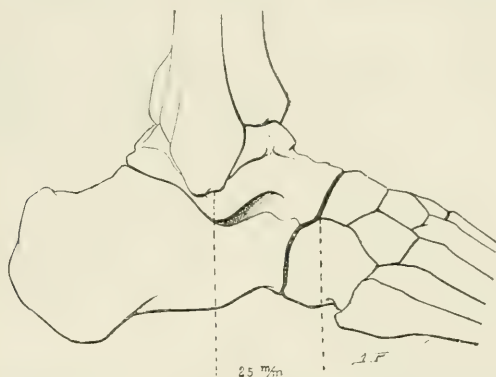


Fig. 584. — Medio-tarsal joint, seen on its external surface; the point of election is at 25 millimetres in front of the external malleolus (in adults).

On the other hand, one must know that by reason of their

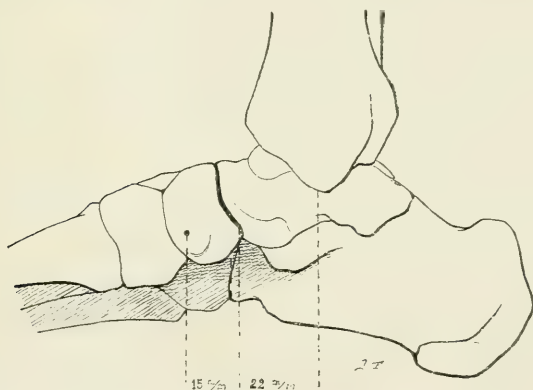


Fig. 585. — The same, viewed on the inner side: the point of election is at 15 millimetres behind the tubercle of the scaphoid; at 22 millimetres from the tip of the internal malleolus.

superficial situation, almost sub-cutaneous, the skin on the dorsal aspect is constantly in danger, either from punctures which, in course of time, diminish its resistance, or (from

within out) from fungosities. It is necessary then to redouble the precautions to avoid the opening of white swellings of these small joints.

If there is a prominent spot, for example a projecting fungosity, on the plantar aspect, through which you can reach the joints, make use of it; the effusion which you will set up will easily find its way between the bones and the fleshy masses of the sole, and the skin will easily be saved.

If it is, on the contrary, towards the dorsal aspect of the foot that the fungosities point, especially if they have already commenced to erode the deep surface of the integument, you are obliged to attack them there. — Then, inject with a fine Pravaz needle (puncturing outside the invaded points) a but slightly “irritating” liquid, and in a small dose; inject, for instance, a few drops (6, 8, 10) of creosoted oil with iodoform (rather than camphorated naphthol, which would occasion a too vigorous reaction).

If a liquid effusion is produced with some degree of tension, make haste to evacuate it, either by slight pressure made through the skin, after puncturing with a n° 1 or n° 2 needle, or by means of an aspiration in the ordinary way, taking care that you do not use a larger needle than n° 3, — n° 4, would here endanger the integrity of the skin.

Then, again, inject a few drops of creosoted oil, and carry on the treatment by combining the two desiderata of preserving the asepsis of the joint and not causing a fistula to develop.

Some succeed where others fail. It is a matter of attention and slightly also of skill.

When the skin gives way, if it is not at the beginning, if one has already been able to make some injections of modifying liquid and to partially sterilize the tissues, little harm is done; cicatrisation is generally obtained in five days after the rupture of the skin.

In order to secure the healing of the ulcerated skin, follow the treatment indicated on p. 161.

WHITE SWELLINGS OF THE UPPER LIMB

White swellings of the upper limb are less frequent than these of the lower limb, because the latter undergo more fatigue

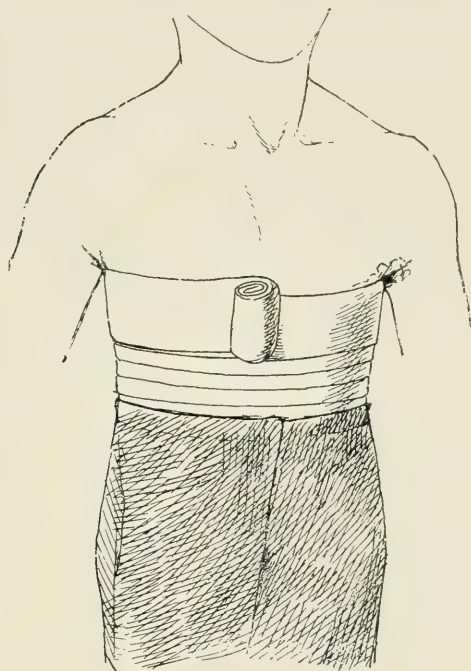


Fig. 586. — How to make a plaster apparatus for the upper limb.
1st step. — Circular turns round the trunk; the plastered bandages are, as in other parts, applied over a vestment which is either an even layer of cotton wool of four or five millimetres thickness or, which is better, an ordinary jersey.

than the former; they attain a much less serious degree in the arms, and they are cured more easily for the same reason.

It follows again that the deviations are less marked and complex apparatus are less often necessary, or are required for a much shorter time, in the upper than in the lower limb.

One may ensure the repose of the arm or the fore-arm with a simple sling, adding to it, it goes without saying, a slightly compressive wool dressing to protect the affected joint. If, however, the pain is considerable or the nature of the swelling somewhat serious, it would be quite simple to immobilise more

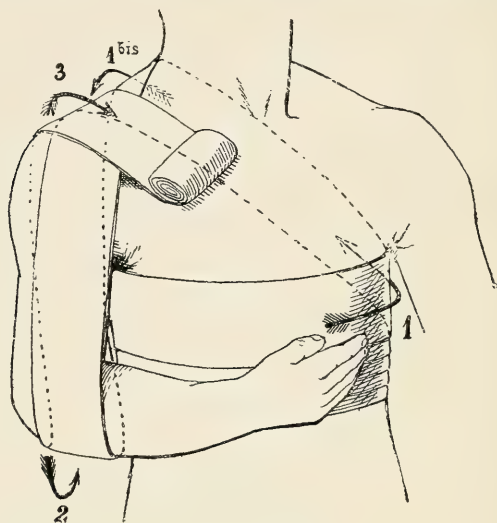


Fig. 587. — How to make a plaster apparatus for the upper limb. *2nd step.* A roller bandage is carried backwards from the axilla of the sound side (1) to the affected shoulder (1 bis.); it is then carried down over the anterior surface of the arm making a bend beneath the flexed elbow (2), it passes upwards behind and crosses over the shoulder (3); one then makes several turns of the same spica, the different spirals overlapping each other (see the first step in fig. 586).

completely the affected region by replacing the soft strip of wool dressing by a few plastered strips.

It is here that moveable plasters or bivalve plasters are chiefly employed; we have given, page 92, the method of constructing them.

With the plaster apparatus — which abolishes pain at once — the patient is at liberty to walk about.

The diagrams here given represent the different apparatus which you may apply, according to the case, to the upper limb.

This is the large plaster which secures the immobilisation of the entire limb, in the case of painful white swelling of the shoulder (fig. 586 to 590).

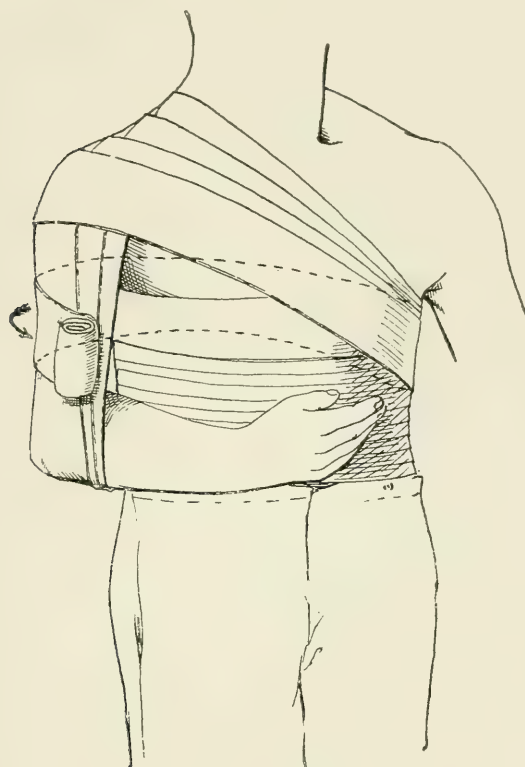


Fig. 588. — The technique of a large plaster for the upper limb (continued).
3rd step. One makes circular turns round the arm.

The large apparatus for white swelling of the elbow is identical with the preceding.

Fig. 591 represents the medium plaster for the elbow. One sees by these diagrams the position in which the upper limb is immobilised :

The arm, in an abduction of from 15° to 20°;

The elbow in the position of flexion at a right angle or, better, at an angle of 70° to 80° (with the arm).

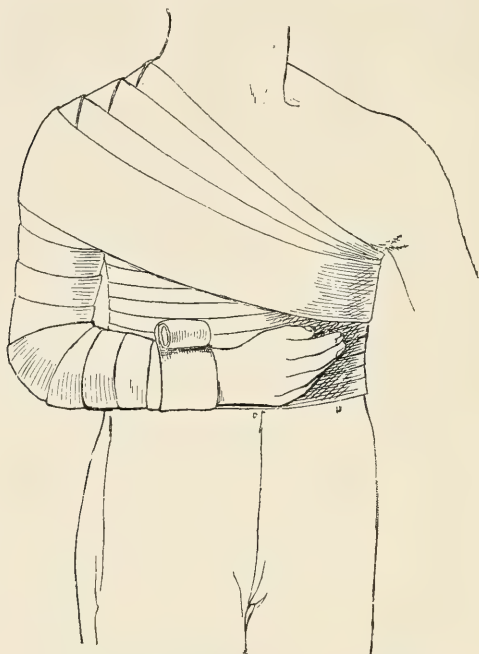


Fig. 58g. — Apparatus for the arm (*continued*).
4th step. One finishes by circular turns round the arm, the forearm and the wrist.

The wrist, in a straight position, without flexion, but without hyper-extension.

A. — WHITE SWELLING OF THE SHOULDER

Technique of the injections. — Fig. 593 shews the anatomy of the joint and the extent of the synovial membrane.

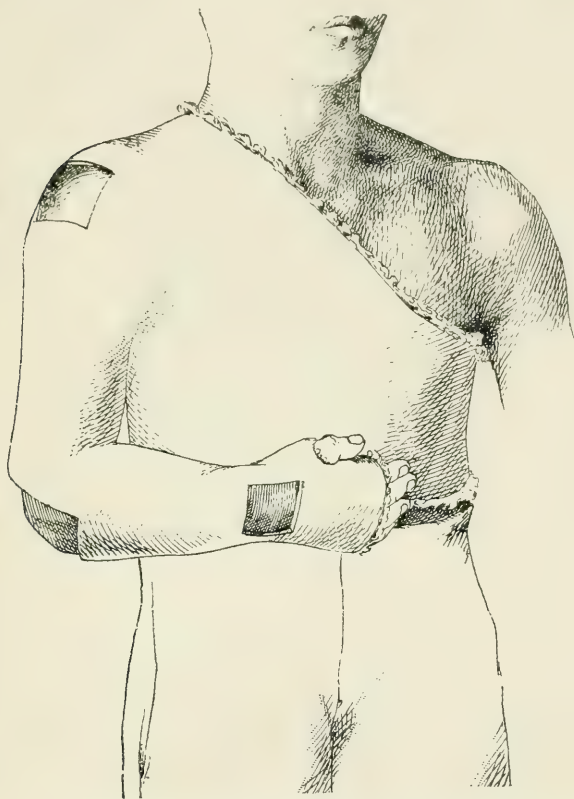


Fig. 590. — Apparatus for the upper limb completed, furnished with openings opposite the different articulations.

There are several points where one can reach the synovia. Keep only to the two following;

1st. **On the outer side**, in the bicipital cul-de-sac of the general cavity of the joint;

2nd. **In front, between the coracoid process and the bicipital groove.**

It is the second route, that is, **the anterior route**, which I advise you to **follow in all cases**¹ (fig. 593). The pointed coracoid process is always easy to feel, even in fleshy subjects (fig. 595), at the antero-internal part of the bony vault of the



Fig. 591. — Medium apparatus for the upper limb immobilising the elbow and the wrist (one can easily make it a bivalve).

shoulder. From the bony point of the **coracoid process**, go horizontally **outwards** :

To half a centimetre of the process, in a child ;

To one centimetre in an adult ; and push in your needle at this point, from before backwards and a little (15°) upwards. You feel the head of the humerus with the extremity of the needle, and it will be easy, on manipulating the humerus, to assure yourself that you are well upon the head of the bone.

That done, you withdraw the needle for one or two millimetres and then push in your injection.

If you inject every day, you will find some fluid collected by the third or fourth day.

1. Because it is rather difficult to make the liquid penetrate the bicipital cul-de-sac.

One should know that it accumulates at the posterior part especially, or in the most dependent part of the joint rather than in front.

It is therefore in the back part of the shoulder (or even at



Fig. 592. — One punctures at one centimetre outside the coracoid process.

the posterior part of the axilla) that, from the third or fourth day, you will find fluctuation, although you have made your injections in front.

When fluctuation is appreciable at some point, you puncture there. — But if you prefer to puncture only in front, you can cause the whole of the fluid to move towards this point by pressing with the flat hand over the opposite dependent part of the collection in the joint.

One makes the necessary ten punctures and injections: after which, one empties to the bottom the articular cavity, by two supplementary punctures, without the consecutive injections. During this treatment, as well as after it, one supports the

shoulder merely with a Velpeau bandage, which covers the dressing, and with a sling, which supports the arm.

It is only in **acutely painful cases** that one would apply

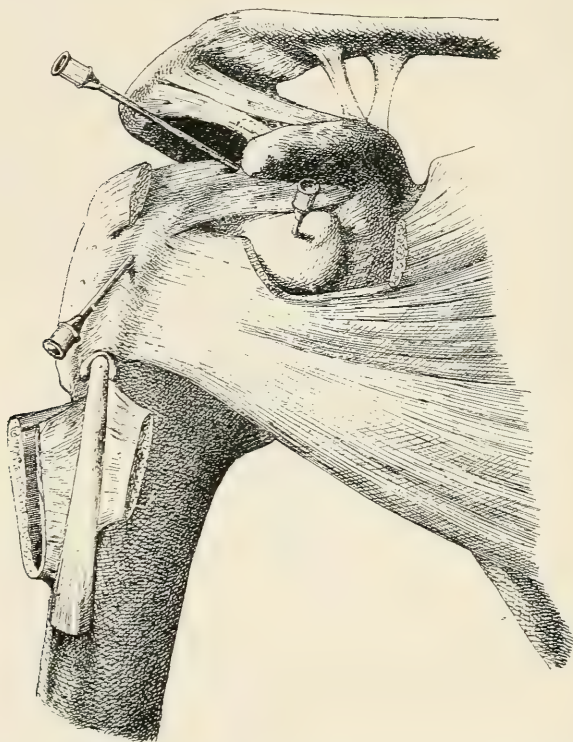


Fig. 593. — Shoulder joint after injection of the synovial cavity. The sketch shows the different points by which one can reach it with the needle.

the **large apparatus** (in the way indicated above) with an opening over the anterior part of the region through which to make the necessary injections. But this plaster apparatus must be removed immediately the pain has disappeared, for instance 15 or 20 days after the cessation of the injections.

One does not therefore ever make a strict and prolonged immobilisation of the joint.

The advantage of this course is, that the movements of the joint have not time to be lost, at least completely, and that they return generally in the first few weeks which follow the end of active treatment.



Fig. 594. — The needle may be forced between the acromial vault and the head of the humerus.

They return spontaneously. The patient, when he no longer suffers, instinctively extends the field of movement of the shoulder. A little later, he makes use of his arm for slight purposes, without actually imposing hard work upon it, for several months more.

To aid the return of mobility, one orders the patient daily baths : the baths of Barèges, of Argelès-Gazost, of Bourbonne, etc., etc.

The treatment of fistulæ presents nothing you do not already know after having read the first part of this chapter.

As to function. Stiffness and Ankylosis.

We have stated that if the arm has not been strictly immobilised beyond a few months — and this will not be so by the

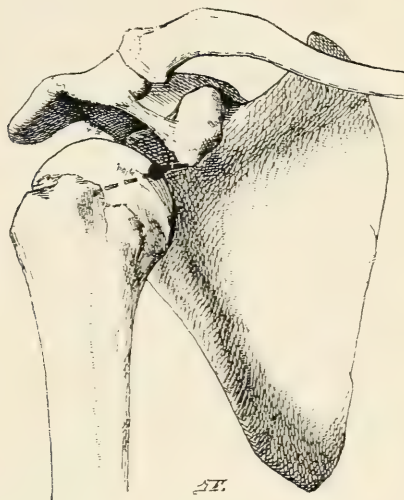


Fig. 595. — The point of election for the injections is found at one centimetre outside the coracoid process, which is always easily felt.

treatment with articular injections — the movements will not, as a rule, be lost.

If you find yourself in the presence of a complete ankylosis, do not interfere with it; it is safer.

Your patient is well cured, thanks to the supplementary and compensatory mobility of the scapula; and you would run too much risk of aggravating the situation, instead of improving it, by undertaking the forced mobilisation of the ankylosis.

It is especially the business of specialist surgeons, working in orthopædic institutions, to undertake, in certain cases, these attempts at mobilisation (fig. 596).



Fig. 596. — Method of fixing the stump of the shoulder.

B. — WHITE SWELLING OF THE ELBOW

In the elbow, as in the knee, the technique of the injections is particularly easy. One enters, either by the radio-humeral interline, which one feels over the external border of the elbow—making movements of rotation in the fore-arm—or, by preference, a few millimetres **above the point of the olecranon**, because the route is here wider and more accessible (fig. 597 to 599).

In flexing the fore-arm to a right-angle, one easily feels the point of the olecranon, and above it the tendon of the triceps stretched in this position. It is sufficient to puncture at 3 or 4 millimetres above the bony point, and outside of the middle of the tendon to penetrate easily and surely into the joint cavity.

After a few injections, the supra-olecranon cul-de-sac becomes distended, and the technique becomes still more easy. The synovial cavity is placed so far from the skin that one here runs no risk of fistula.

Bad Positions. The elbow ought to be at an angle of from 70° to 80° , in the case where, in spite of every care, ankylosis has occurred (v. fig. 591, p. 552).

If it is not in that position, one must place it there, by stages,

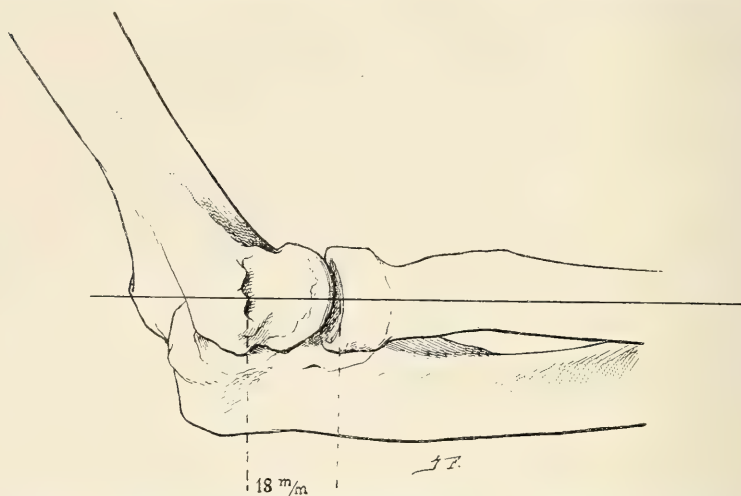


Fig. 597. — The elbow joint seen on its external aspect : the radio-humeral articulation is found at 18 millimetres from the tip of the epi-condyle.

making partial corrections followed by the application of small plasters, recommencing every eight or fifteen days with a new correction.

Stiffness and Ankylosis. The movements nearly always return spontaneously, provided that one has not uselessly prolonged the immobilisation by plaster apparatus. That is why we generally keep it up simply with soft bandages. Leave the movements to return of their own accord — helping them, after five or six months of waiting, by baths or by slight gently passive movements, made by the patient himself, in this way :

The arm is held by two straps or by some person's hand, on the surface of a table, the patient being seated. With the sound hand, he takes his stiffened fore-arm and makes slight movements in every direction : flexion and extension, prona-

tion and supination. In this way we have obtained some very excellent cures (see also fig. 604).

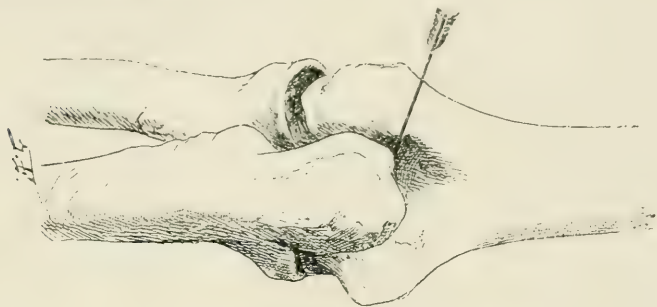


Fig. 598. — The needle strikes the articulation by the supero-external angle of the olecranon and penetrates into the olecranon cavity.

What we are now going to describe relates exclusively to incomplete fibrous ankyloses.

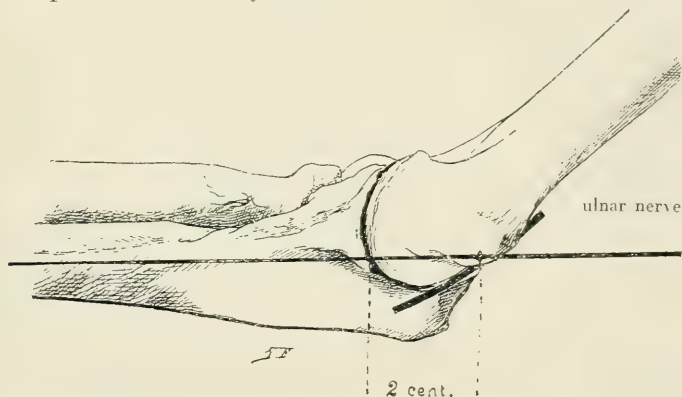


Fig. 599. — The elbow joint seen on its internal aspect : the ulno-humeral interline is found in the axis of the ulna, at two centimetres from the epitrochlea.

In the case of a patient coming to you with a complete osseous ankylosis, do not interfere with it if the position is good, that is, if the elbow is flexed at an angle of from 70° to 80° .

If the ankylosis is bad (the elbow in complete extension),

correct it by an incomplete osteotomy, making use of artificial fracture, or, just as well, keep exclusively to manual osteo-



Fig. 600. — Injection into the elbow joint.

clasis, which you may perform in the following manner :
Some wooden splints are placed round about the arm, and

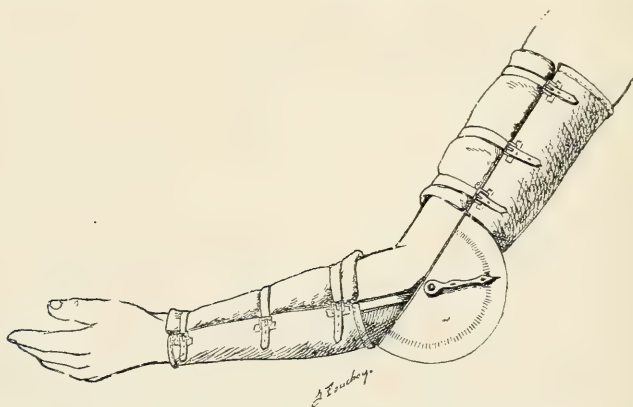


Fig. 601. -- Jointed dial apparatus for mobilisation of the elbow. To effect flexion, one can join the two levers with elastic cords.

others around the fore-arm. Whilst the arm is firmly held, you seize the fore-arm with both hands and carry it in the direction of flexion. Separation takes place at the interline.

The fore-arm being flexed at a right angle, you fix it in that position with a plaster which you leave on for two or three weeks; after that, you take off the plaster and order baths and massage.

As a rule, ankylosis is reproduced, but in a very good position. Sometimes you may be fortunate, enough to see useful movement return.

A resection might, exceptionally, enable you to restore some amount of movement — but how rarely! — and scarcely ever without prejudice to the strength of the arm — so that, everything considered, I dare not advise you to have recourse to that operation — provided that the elbow is ankylosed at a right angle.

C. — WHITE SWELLING OF THE WRIST AND OF THE SMALL ARTICULATIONS OF THE HAND

1st White Swelling of the Wrist.

Anatomy. — The two extremities of the interline are easily found. The centre of the interline, in the adult, is found at from 6 to 7 millimetres above the straight line connecting the two apophyses (fig. 602). With this indication you will know how to introduce a fine needle into the interline.

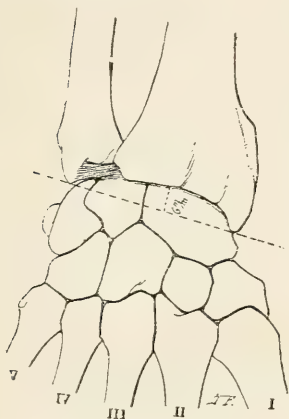


Fig. 602. — The point of election for injection into the radio-carpal joint is found at 6 millimetres above the centre of a line connecting the extremities of the styloid processes of the ulna and radius.

Very often, you will perceive on the dorsal aspect of the hand some projecting fungosities, developed in the culs-de-sac of the synovial membrane. It is by means of these prolongations of the synovial membrane that you will be able to force your liquid into the cavity (fig. 603).

Remember that the soft parts are rather thin on the dorsal aspect of the wrist, and that one ought, consequently, to take every precaution in dealing with the skin. We refer you to what we have already said on this subject with regard to the ankle, where the situation is identical.

Ankylosis of the Wrist. Here again, the best treatment for ankylosis is the preventive treatment. If you treat the white swelling by means of injections, without plaster, the wrist will not become ankylosed. I have never seen ankylosis of this joint since I have treated white swelling in this way.

But a patient, treated elsewhere, may come to you with an ankylosis already established. If it be fibrous, you will treat

it by slight methods : massage, baths; and you will leave the patient himself to carry out with his sound hand some gentle movements (five or six sittings daily of ten minutes each), the fore-arm being immobilised on the table by another person, or by means of a strap.

If the ankylosis is osseous, leave it alone ¹.

2nd White Swelling of the Hand and Fingers.

One sees, at fig. 602, the situation of the interline of the medio-carpal articulation.

These swellings ought to be attacked by injections in small



Fig. 603. — Point of penetration of the needle. But one does not need to force the needle so far as is represented here.

doses, at intervals, made each time at a different place, and in such a way as to keep the skin whole whilst attacking the lesions.

Thinking always of the integrity of the skin, it is in this way that one ought to treat **spina ventosa**. I mention this in passing, though it does not enter into our present study, since it is, at any rate at its onset, a disease of the diaphyses of the phalanges rather than of their joints (see *Spina Ventosa*, Chap. XIX).

1. Nevertheless, it has happened to me to interfere personally in a case of complete ankylosis in a young lady from Rotterdam, where, by a non-surgical operation (under chloroform) I broke down the osseous adhesions. I saw the movements return completely, thanks, I ought to say, to a consecutive treatment of several months; a treatment very gentle and very methodical, carried out by a skilful and well-informed masseur, my regretted friend, Dr Fourriere.

Ankyloses of the fingers are treated like those of the wrist (see above). Do not interfere with osseous ankyloses¹.

CONVALESCENCE AFTER WHITE SWELLING

Read again what we have said about the convalescence of hip disease, which is merely a white swelling of the hip-joint (see Chap. vi).

By what signs would one recognise that a white swelling

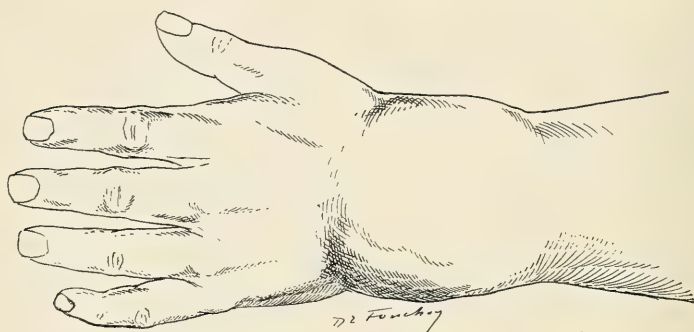


Fig. 604. — White swelling of the wrist. Deformity of the dorsal region.

is cured? — By there being no appreciable fungosities, and there being no longer any pain.

The disappearance of pain on pressure is the clinical criterion of cure.

From this time, reckon again from 5 to 6 months as a minimum before thinking of the anatomical cure. After these 5 or 6 months leave the joint to itself to recover its normal functions, by freeing it of all apparatus outside walking exercise, unless you wish for ankylosis, in which case you will keep

1. Here again, nevertheless, I have obtained a complete result in a child from Paris who had an osseous ankylosis of two phalanges of the thumb. Four months after the forcible breaking down of the ankylosis, a good result was obtained, thanks again to Dr Fourriere.

on the apparatus for a long time. And, it is necessary to look for ankylosis in all cases where preservation of movements gives rise to persistent pain or allows a deviation to be reproduced.

We repeat that, when it is a question of choosing between a good position and mobility, it is the latter which must be sacrificed.

To sum up, as to white swellings of the lower extremity :

Do not place your patient **on his feet until** the tuberculous is cured, that is, **until there is no pain** (for six months).

You will not **discontinue** all **apparatus until** a **good position** is **preserved** naturally.

Duties of the Practitioner during Convalescence.

Your rôle is not finished yet. It is, for more than a year, quite as important as it was during the active period of the disease.

But, alas ! there are practitioners who take no more interest in the patient when the pain or puffiness of the articular region has disappeared.

They do not know that they have still a double duty to fulfil.

1st duty. — The practitioner ought to return the patient to his ordinary life gradually, in order to avoid a relapse, or more exactly, a revival of the disease. In order to do that he must watch over the general condition of the patient and the state of the joint.

2nd duty. — He ought to watch over the functional result obtained; to prevent the good result being compromised or lessened, and on the contrary, to help on improvement, by all the means in his power.

1st duty. — To prevent a Relapse or a Recurrence

We can only repeat here what we have said with regard to hip-joint disease. One ought to take, for a much longer time, precautions of the general and local order. I mean by **precautions of the general order** that one must not hasten the return of the cured patient to the city, or to the surroundings,

often unhealthy, where he was taken ill. It is necessary to attend to his diet and his hygiene and to avoid all possible contagion.

From the local point of view : one cannot at once impose upon a joint which has just recovered, the same work that one would upon a joint which has always been sound. It is only gradually that its natural functions will return.

One realises that the upright position, or walking, if it is a question of the lower limbs, can only be maintained, at the beginning, for a few minutes.

In certain cases, it is necessary to help the weak joint by enclosing it in an apparatus, plaster or celluloid, which will ensure its rest. The support of two sticks is useful for walking, and for six months one may even use crutches, which relieve the knee or the foot of the weight of the body. Such are the means of preventing the return of the disease, or at least of rendering a return as rare as possible; for a debilitating disease, appearing unfortunately soon after the cure, an eruptive fever, broncho-pneumonia, etc., or again, a traumatism, a sprain or a blow on the joint, might re-kindle the tuberculous focus, whatever has been done so far. The parents should fly from all foci of contagion, and religiously guard the child from all chances of injury and from all fatigue.

2nd duty. — To maintain and improve the functional result. — Take care, nevertheless, of all unseasonable zeal.

Adhere to the simple methods : massage, baths, teaching to walk.

At the same time, do not have recourse even to those simple methods until from six to ten months at least after the real cure of the white swelling.

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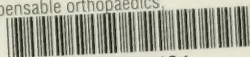
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